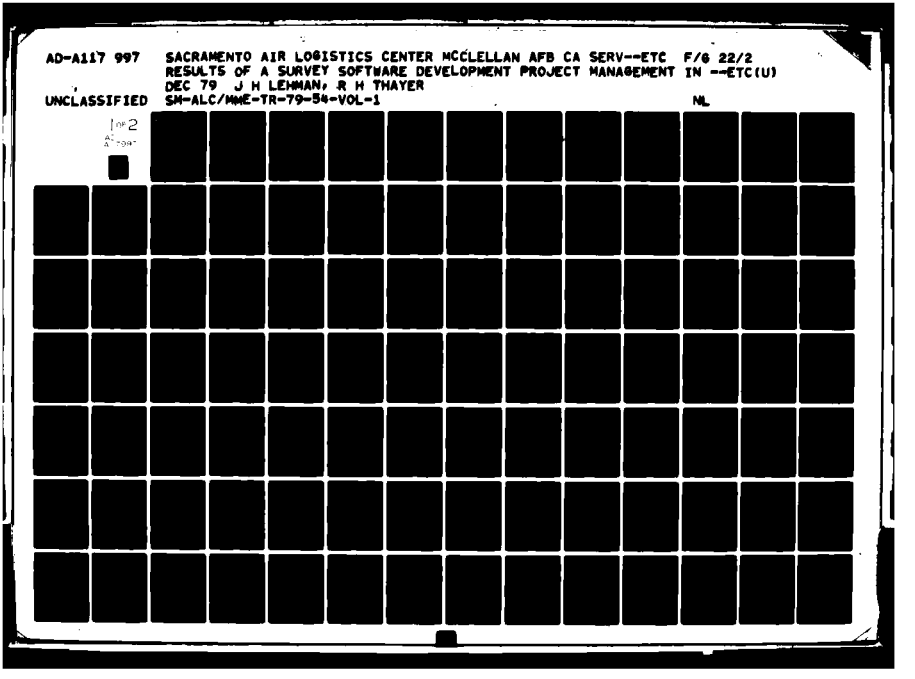

AD-A117 997
SACRAMENTO AIR LOGISTICS CENTER MCCLELLAN AFB CA SERV--ETC F/G 22/2
RESULTS OF A SURVEY SOFTWARE DEVELOPMENT PROJECT MANAGEMENT IN --ETC(U)
DEC 79 J H LEHMAN, R H THAYER
UNCLASSIFIED
SM-ALC/MME-TR-79-54-VOL-1
NL
1 OF 2

SM-ALC/MME-TR-79-54,-Volume I

18 December 1979

RESULTS OF A SURVEY
SOFTWARE DEVELOPMENT PROJECT MANAGEMENT
IN THE U.S. AEROSPACE INDUSTRY

VOLUME I

COMPANY ENVIRONMENT, ORGANIZATION AND PROCEDURES

JOHN H. LEHMAN
CALIFORNIA STATE UNIVERSITY
SACRAMENTO, CA 95819

AND

RICHARD H. THAYER
SACRAMENTO AIR LOGISTICS CENTER
AIR FORCE LOGISTICS COMMAND
MCCLELLAN AFB, CA 95652

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS SACRAMENTO AIR LOGISTICS CENTER (AFLC)
MCCLELLAN AIR FORCE BASE, CALIFORNIA 95652

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER: SM-ALC/MME TR-79-54 VOLUME I 2. GOVT ACCESSION NO.: AD-A117997	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): RESULTS OF A SURVEY: SOFTWARE DEVELOPMENT PROJECT MANAGEMENT IN THE U.S. AEROSPACE INDUSTRY VOLUME I: COMPANY ENVIRONMENT, ORGANIZATION AND PROCEDURES	5. TYPE OF REPORT & PERIOD COVERED: Technical, Final 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): John H. Lehman (California State University, Sacramento) and Richard H. Thayer	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Directorate of Material Management, Sacramento Air Logistics Center, McClellan Air Force Base, California 95652	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: VOLUME I: COMPANY ENVIRONMENT, ORGANIZATION AND PROCEDURES
11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE: 18 December 1979 13. NUMBER OF PAGES: 169
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release, unlimited distribution

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Prepared in cooperation with the American Institute of Aeronautics and Astronautics (AIAA) Technical Committee on Computer Systems.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Software Engineering Project Management, Software Development, Survey, Project Management, Organization.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

See separate sheet following.

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

ABSTRACT

RESULTS OF A SURVEY
SOFTWARE DEVELOPMENT PROJECT MANAGEMENT
IN THE U.S. AEROSPACE INDUSTRY

Volume I: COMPANY ENVIRONMENT, ORGANIZATION AND PROCEDURES

BY

JOHN H. LEHMAN AND RICHARD H. THAYER

This report contains the results of a survey conducted in 1977 and 1978 on how the U.S. Aerospace Industry manages its software development projects. The sample of the U.S. Aerospace Industry that was surveyed consisted of those firms and companies with a membership in the AIAA Technical Committee on Computer Systems. These committee members represented 47 major corporations or major corporation subdivisions and occupied top positions in software management within their firms.

The survey used a rather lengthy questionnaire containing 225 numbered questions, however approximately 1,328 separate responses were possible. The survey was divided into three parts. Part One deals with defining the total organization, management structure, requirements, and philosophy of the firm and was intended to be answered by top management to provide the backdrop against which the individual projects would be viewed. Part Two concerns questions about individual projects which were aimed at, and intended to be completed by, the project manager. Part Three was primarily designed to obtain the opinions and perceptions of the project managers developing software on how they viewed major issues and/or major projects of software engineering project management.

This paper reports on only a portion of the answers to the questionnaire - Part One, the project environment. The other portions - dealing with the actual projects, and software development problems - are reported in Volumes I and III.

The answers have been condensed and/or coded and recorded on a tabulation sheet in this report. In addition, the narrative portion of the survey is recorded in clear text with all references to individuals and/or their companies deleted. This report does not attempt to analyze or come to conclusions about the data, only to report it as clearly as possible.

TABLE OF CONTENTS

SECTION 1
RESULTS

BACKGROUND

In the spring and summer of 1977, a survey was conducted on the U.S. Aerospace Industry to determine what management techniques and procedures they were employing in software development projects. It was originally accomplished to collect data for analysis and the preparation of a paper on Software Engineering Project Management, to be presented at the American Institute of Aeronautics and Astronautics (AIAA) Conference, Computers in Aerospace, 31 Oct-2 Nov 1977.

The sample of the U.S. Aerospace Industry surveyed consisted of those firms and companies with a membership in the AIAA Technical Committee on Computer Systems who were hosts to the conference. These committee members represented 47 major corporations, or major corporate subdivisions, and occupied top positions in software mangaement within their firms. They were, therefore, in an ideal position to report on how their segment of the U.S. Aerospace Industry managed its software development projects.

Initial contact was made in May 1977 to determine which members of the committee would be interested, willing, and able to participate. Forty-five members, representing 35 companies, agreed to respond. The initial draft of the survey was completed in June 1977 and critiqued by approximately 25% of the total committee membership. The results of this critique, along with other corrections, were incorporated into the final survey. The survey was mailed 10 August 1977. On 6 September 1977, with 29 of the completed surveys on hand, the authors of the survey wrote the first report for the proceedings of the Conference, Computers in Aerospace. This paper can be found in the Conference Proceedings, A Collection of Technical Papers. By the time the actual presentation was

given on 1 November 1977, questionnaires from 33 companies representing 55 projects had been received. These companies, predominantly aerospace firms with government contracts, reported mostly on large to very large projects. The presentation given (called Report Nr 2, AIAA Project Management Survey) differed from the paper in so far as it used the more complete data and a different approach.

The survey did not end there, for completed forms continued to arrive until, by the summer of 1979, 66 projects representing 38 firms for a 86% return rate had been received (see Appendix A for a list of participants). A decision was made by the AIAA Technical Committee on Computer Systems to make further use of the data by writing an assessment paper on the state-of-the-art in software development project management. Mr Gene F. Walters, General Electric Co., Command and Information Systems, Sunnyvale, California and Mr Jack E. Bloodworth, Boeing Aerospace Company, were given primary responsibility for this paper. In addition, the Rome Air Development Center (RADC), the Boeing Aerospace Company and the Sacramento Air Logistic Center offered their services, and in some cases the services of their company's data processing capability to reduce and analyze the data.

The remaining problem was to reduce the data into a form useable by a computer. This involved "coding" the narrative and free form answers of the survey and verifying their consistency.

PURPOSE OF SURVEY

As previously stated, the purpose of this survey was to look at a sample of the U.S. Aerospace Industry through the use of a questionnaire to determine how they managed software development projects. Specifically, the questions that the survey attempted to answer were:

1. What are the current practices in Software Engineering Project Management today?

2. Are the new developments in management, i.e., "modern" management techniques or project management techniques, being used?

3. What are the trends in Software Engineering Project Management?

4. What are the relationships between Software Engineering Project Management techniques and successful delivery of software?

5. What are the relationships between various parts of Software Engineering Project Management as a system?

6. What are the relationships between "modern" Software Engineering techniques and Software Engineering Project Management?

THE SURVEY

The approach taken in determining answers to these questions was to first design a model for software engineering project management as a system and define the elements of that model and the relationships between these elements, and second, develop a questionnaire around this model using the various elements and/or variables as questions and possible responses. The survey contained 225 numbered questions and, by use of "questionnaire packing techniques," allowed for approximately 1,328 separate responses.

The survey, which contained 72 pages, was divided into three parts. Part One dealt with defining the total organization, management structure, requirements, and philosophy of the firm and was intended to be answered by top management to provide the backdrop against which the individual projects would be viewed. Part Two concerned questions about individual projects and was intended to be completed by the project manager. Part Three consisted of general questions, not project specific, calling for evaluation, opinions, and suggestions on the major problems of software engineering project management. It was also intended to be completed by a project manager.

PURPOSE OF THIS REPORT

This paper has been prepared to report the answers to Part One of the questionnaire in "raw" form so that they may be entered into a computer data base as well as to satisfy the many requests received from the computing community for access to the data collected as a result of this survey. The answers to Part Two, Part Three are provided in Volumes II and III.

Because of the restrictions placed by the participants on the use of their submissions, the actual completed surveys cannot be distributed and have been destroyed. This report was selected as a means of documenting and capturing as much of the "raw data" as possible without any possibility of revealing its source. In essence, this report does not contain "raw data" but reduced data in abbreviated and coded form that efficiently separates it from its source while allowing interested computer scientists its use for their own requirements.

This report does not attempt to analyze or come to conclusions about the data, only to report it as clearly as possible. Only minimum interpretation was made to enable the answers to be tabulated for eventual analysis. Although 38 companies reported (on 66 projects) only 34 Part Ones are reported: One company was too small and did not fit the norm, one company did not report a Part Two or Three, qnd two companies did not report a Part One.

CONTENTS OF THIS REPORT

As already stated, the purpose of this report is not to analyze the data from the AIAA Project Management Survey, but to report it as simply and accurately as possible, and to keep within the original ground rules of maintaining anonymity of the participants. Section 2 contains the questions and answers to this survey and Section 3 contains cited references. The participants in the survey are listed in Appendix A.

A duplicate copy of the questionnaire is in Appendix B. The questionnaire is included to allow the reader easy access to the questions and predefined answers to provide a ready familiarity with the type of material covered.

Appendix C contains the abbreviations used in reporting the narrative portions of this survey. Since the reduction of comments to code destroyed some of the richness of prose, the author felt it worthwhile to include the actual responses and these are recorded in Appendix D. To maintain the concept of protecting the participants' identity, the narrative answers cannot be tied to any project reported in Section 2.

THE FUTURE

This survey is, as far as the author can determine, the first attempt to query an industry on such a large scale to discover how their software engineering projects are managed. A look at the list of contributors in Appendix A will attest to the significance of this base of answers. The tremendous volume of data collected and the excellence of the responses dictates that this store of information be made available as reference material for papers, reports, texts, and other technical publications which might benefit the U.S. Aerospace Industry or the data processing community at large. The AIAA Technical Committee on Computer Systems is anticipating the preparation of an assessment paper on industries management of software engineering projects. This committee welcomes suggestions from the computing and aerospace communities on how to best use this data for the benefit of all. Suggestions should be sent to either:

Mr Gene F. Walters
Mgr, Software Technologies
Information Systems Programs
General Electric Company
1277 Orleans Drive
Sunnyvale, CA 94086
(408) 734-4980

Mr Jack E. Bloodworth
Mgr, ALCM Software
The Boeing Aerospace Company
MS-45-70
P.O. Box 3999
Seattle, WA 98124
(206) 655-6718

The Rome Air Development Center (RADC) has contracted with ITT Research Institute (IITRI) to establish and operate a software information analysis center. The center has been named the Data and Analysis Center for Software (DACS). One of the functions of DACS is to acquire and analyze data gathered during the various phases of the software development process with the purpose of identifying and quantifying those factors which contribute to the production of quality software. The data from this survey has been contributed to DACS and is available for analysis by any member of the AIAA Technical Committee on Computer Systems as well as the general computer community. Personnel interested in

receiving copies of this data, or requesting analysis of this data should contact:

Ms Lorraine Duvalle
Data & Analysis Center for Software
RADC/ISI
Griffiss AFB, NY 13441
(315) 336-0937

ACKNOWLEDGEMENTS

In addition to the contributors listed in Appendix A, the author wishes to acknowledge the support and dedication of the following people:

From the Sacramento Air Logistics Center

Personnel who provided programming and analyst support are: Ms Bonnie J. Nieland, Mr Robert D. Heckler, Mr Grover "Bob" Collins, Mr John W. Robino, and Mr David E. Sturdevant.

The following individuals provided typing, proofreading, and composing support: Mrs Terry L. Meyer, Mrs Beryle E. McPheeters, Mrs Marianne L. Mueggenburg, and Mrs Betty J. Smith.

From the Boeing Aerospace Company

The Boeing Company's integrated logistic and systems maintenance team, consisting of Mr D. H. Wilson, Mr G. R. Herrold, and Mr W. B. Dalrymple, provided support in the areas of data reduction, data base structure, and file updating and verification. Dr Kenneth A. Hales, 1977 president of the AIAA Technical Committee on Computer Systems, provided the support of his committee in testing and completion of the questionnaires.

From the General Electric Company, Space Division

The Information Systems Program in Sunnyvale provided technical consultant support, proofreading, printing and encouragement through the services of Mr Gene F. Walters and his technical group.

From the Rome Air Development Center

RADC had offered to perform analysis of the data for the benefit of the U.S. Air Force, the AIAA Technical Committee on Computer Systems, and the computing community. Personnel responsible for this are: Mr Donald Roberts and Mr Alan R. Barnum. Ms Lorraine Duval, ITT Research Institute, who is general manager of the RADC Data and Analysis Center for Software (DACS), became the custodian of the data from this survey.

Special Acknowledgements from Sacramento, California

Mr Walter L. Antwiler from Sacramento, California spent many hours coding and recoding the survey answers for computer analysis. Mrs Mildred C. Thayer, Ms Lauren M. Thayer and Miss Meg L. Astleford proofread the typed copies and checked machine listings.

ATTACHMENT 1 TO SECTION 1

RELATIONSHIPS BETWEEN REPORTS

The survey was comprised of three parts, each dealing with a separate facet of software engineering project management. Part One dealt with the firm and the environment in which the project was done. Part Two was devoted to specific software engineering projects accomplished within the firm. Part Three asked the project managers their opinions about project management. Each of these parts can stand alone. Part One, reported in this volume, centers on the organization, management policies, staffing techniques and project controls of the companies that completed project questionnaires reported in Part Two.

Part Two, reported in Volume II of this report series, provided both detail and summary information on each project for which a valid questionnaire was returned. Each questionnaire could be considered a case study in project management. Part Three, reported in this Volume III of this report series, concerns ideas and perceptions about software engineering project management but does not relate to a given project or company.

At the same time, there is a relationship between these reports. Table 1 tells the relationships between Volumes I, II and III of this report.

TABLE 1 (ATTACHMENT 1 TO SECTION 1)

RELATIONSHIPS OF PROJECTS REPORTED IN AIAA

PROJECT MANAGEMENT SURVEY VOLUMES I, II AND III

Survey Identification Nr (1)	VOL I (Part One) (2)	VOL II (Part Two) (3)	VOL III (Part Three) (4)
101	30	101	Yes
102	30	102	Yes
103	30	103	Yes
104	31	104	Yes
105	33 (8)	105	Yes
106	34 (8)	106	Yes
107	35	107	Yes
108	35	108	Yes
109	35	109	Yes
110	36	110	Yes
111	36	111	Yes
112	39 (9)	112	Yes
113	40 (9)	113	Yes
114	41	114	Yes
115	69	115	No
116	42	116	None
117	43	117	Yes
118	45	118	Yes
119	45	119	Yes
120	51	120	Yes
121	66 (5)	121	Yes
122	51	122	Yes
123	51	123	Yes
124	51	124	Yes
125	52	125	Yes
126	55	126	Yes
127	None	127	Yes
128	59	128	No
129	None	129	Yes
130	31	130	Yes

(TABLE 1 CONTINUED)

Survey Identification Nr (1)	VOL I (Part One) (2)	VOL II (Part Two) (3)	VOL III (Part Three) (4)
201	67	201	None
202	27 (7)	202	Yes
203	28 (7)	203	Yes
204	29	204	Yes
205	32	205	Yes
206	37	206	Yes
207	37	207	Yes
208	38	208	Yes
209	43	209	Yes
210	44	210	Yes
211	46 (10)	211	Yes
212	47 (10)	212	Yes
213	49	213	Yes
214	49	214	Yes
215	49	215	Yes
216	49	216	Yes
217	50	217	Yes
218	53 (11)	218	Yes
219	54 (11)	219	Yes
220	56	220	Yes
221	57	221	Yes
222	60	222	Yes
223	60	223	Yes
224	58	224	Yes
225	58	225	Yes
226	58	226	Yes
227	61	228	Yes
228	61	228	Yes
229	64	229	Yes
230	68	230	Yes
301	26 (6)	301	Yes
302	48 (10)	None	None
303	25 (5)	None	None
304	68	304 (12)	None
305	62	None	None
306	63 (7)	None	Yes

FOOTNOTES FOR TABLE 1

(1) Column 1 - This column lists the returned surveys according to a randomly assigned identification number.

(2) Column 2 - The company identification number listed in column 2 is used in Vol I. In some cases, the same company was reported on by two or more individuals which resulted from two or more project managers reporting on different projects within the same company. In most instances these "double" reports were the same. Comments along these lines are contained in foot notes (5) through (12).

(3) Column 3 - This column lists the project numbers reported in Vol II. Projects with the same company numbers are from the same company or major subdivision.

(4) Column 4 - Vol III reports on data from Part Three. This column indicates whether or not the same person reported/wrote Part Two and Part Three of the survey. This is done so that the reader will know if there is any relationship between the project reported on in Part Two and the surveyee's opinions on the major problems of software development management.

(5) Company 25 and 66 are the same.

(6) Very small company. Part Three is reported as Part Three of Project 201.

(7) Company 27, 28 and 63 are the same. Answers reported under company 28 looked to be the most accurate and complete. Part Three of company 63 is reported as Part Three of Project 116.

(8) Company 33, 34 are the same. Answers reported under company 33 looked to be the most accurate and complete.

(9) Company 39 and 40 are the same and have identical answers.

(10) Company 46, 47 and 48 are the same. Answers reported under company 46 are considered to be the official answers by the surveyee.

(11) Company 53 and 54 are the same. Answers reported under company 54 looked to be the most accurate and complete.

(12) Project reported under project 304 was too large to be included.

SECTION 2
THE DATA

INTRODUCTION

This section reports on the actual data submitted by the participants on sixty aerospace projects. It is reported in tabulated, abbreviated and coded form and cannot be used completely without Appendix C. Every effort was made to disguise the contributor, including the deletion of some revealing data.

The questionnaire contained many different styles of questions: true or false, multi-choice answers, multi-part questions, fill-in-the-blanks, and narrative. Despite this multitude of styles, a common method of reducing and reporting the answers was developed (see Appendixes B and C). Multi-part questions were broken into separate questions through the use of part numbers (i.e., 01, 02, 03, etc.) and sub-part designators (a, b, c, d, etc.).

Each question is handled separately and reported as an array. The horizontal indices of the array refer to anonymous project identification numbers (see Section 1 for further explanation). The vertical indices refer to the question, part, and sub-part number. Every narrative answer has been coded or abbreviated by a three-character alphanumeric.

Generally speaking, the printing of a three-character alphanumeric opposite the sub-part of a question idicates that the participant answered "yes" or "true" as it applies to that part of the question. If a given question has a "blank" for an answer this idicates the surveyee answered "no" or "false" as pertains to that part of the question. With the exception of "none" or "missing" the alphanumeric is a code or abbreviation of a text answer that modifies the"yes" answer. The interpretation or meaning of the codes can be found in Appendix C. The author made every attempt to use codes that were easy to recognize (mnemonic).

In order for the reader to compare company environment to projects developed, the results are listed under the project identification number. This results in redundant reporting when a company reported on more than one project. Also, as reported in Section 1, sometimes more than one individual reported on the same company or firm. (The preferred report is reported on in Table 1 of Section 1). For those readers that want to compare results between companies, only the results reported on under the following projects should be used:

103	104	105	109	110
112	114	115	116	117
118	120	121	125	126
128	201	203	204	205
206	208	210	211	213
217	219	220	221	222
224	227	229	230	

Companies that reported on projects 127 and 129 did not fill out a Part One.

The questionnaire as printed in this report is a modified version of the questionnaire as originally answered (see Appendix B, Questionnaire, for explanation).

QUESTION 201

WHAT POSITION DO YOU HOLD IN THE COMPANY? (ORIGINALLY NARRATIVE)
A. SENIOR CORPORATE OFFICER (PRESIDENT, VICE PRESIDENT, EXECUTIVE OFFICER, ETC)
B. SENIOR ADP OFFICER
C. SENIOR FUNCTIONAL AREA (NON ADP) MANAGER (I.E., DIRECTOR OF ENGINEERING, MANAGER AIRFRAME DEVELOPMENT, CHIEF OF PRODUCTION PROGRAM MANAGER)
D. PROJECT MANAGER SOFTWARE DEVELOPMENT
E. TECHNICAL DIRECTOR, QUALITY ASSURANCE, IV&V SUPERVISOR, ETC
F. SENIOR CORPORATE STAFF
G. PROJECT INDIVIDUAL
Y. NONE OF THE ABOVE
Z. OTHER/COMMENT IF NECESSARY

RESPONDR PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																										C02		C02		
01 B				C02				C02	C02	C02																				
01 C					C02	C02																								
01 D											C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02						
01 E	C02	C02	C02																											
01 F													C02																	
01 X																											MIS	MIS		

RESPONDR PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A				C02							C02										C02	C02	C02	C02	C02	C02		C02		
01 D		C02	C02		C02	C02	C02	C02	C02	C02				C02	C02	C02	C02	C02	C02	C02										
01 E																														
01 G	C02																										MIS	MIS		
01 X																														

QUESTION 202

WHAT IS THE TITLE/POSITION OF THE SENIOR ADP OFFICER IN THE FIRM? (E.G., VICE PRESIDENT IN CHARGE OF DATA SERVICES (ORIGINALLY NARRATIVE)

A. CORPORATE OFFICER (PRESIDENT, VICE PRESIDENT, EXECUTIVE OFFICER, ETC.)
B. CHIEF (VICE PRESIDENT, DIRECTOR, MANAGING HEAD) DATA PROCESSING (COMPUTING, INFORMATION SYSTEMS, DATA SERVICES, DATA AUTOMATION, ETC.)
C. ASSISTANT CONTROLLER (FINANCIAL MANAGER, ETC.)
D. SOFTWARE ANALYSIS (ENGINEER, DEVELOPER, ETC.)
Y. NOT APPLICABLE TO ORGANIZATIONAL STRUCTURE
Z. GIVE TITLE/COMMENT IF NECESSARY

	RESPONDOR																											
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	C02	C02	C02																	C02		C02 C02 C02				C02		C02		C02
01 B				C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02	C02								MIS	MIS		MIS	
01 X																			N/A	N/A			C02							
01 Y																														

	RESPONDOR																											
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	C02		C02														C02									C02 C02				
01 B				C02		C02		C02		C02 C02 C02 C02 C02								C02 C02 C02		C02 C02 C02 C02 C02								C02	
01 L									C02																					
01 D		C02																												
01 Y			C02		C02 C02			N/A														C02								

QUESTION C03

WHAT IS THE TITLE/POSITION OF THE INDIVIDUAL TO WHOM THE SENIOR ADP OFFICER REPORTS? (E.G. PRESIDENT, COMPTROLLER)
(ORIGINALLY NARRATIVE)
A. CORPORATE OFFICER (PRESIDENT, VICE PRESIDENT, EXECUTIVE OFFICER, ETC.)
B. COMPTROLLER (VICE PRESIDENT FOR FINANCE, ETC.)
C. SENIOR FUNCTIONAL AREA (NON ADP) MANAGER (DIRECTOR/CHIEF OF ENGINEERING, RESEARCH, OPERATIONS, ETC.)
D. FUNCTIONAL AREA SUPERVISORS
Y. NOT APPLICABLE TO ORGANIZATIONAL STRUCTURE
Z. OTHER/COMMENT IF NECESSARY

RESPONDER

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	C02		C02									C02	C02		C02					C02		C02	C02	C02				C02		
01 B		C02		C02																									C02	
01 C					C02	C02	C02	C02	C02	C02	C02		C02			C02	C02								C02						
01 D																												C02		
01 X																											MIS		MIS	
01 Y															N/A	N/A				N/A										

RESPONDER

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	C02			C02	C02			C02					C02	C02	C02	C02	C02			C02		C02	C02					C02	C02		
01 B																														C02
01 C										C02								C02	C02					C02	C02	C02		C02		
01 D		C02									C02	C02																		
01 Y			N/A			C02	C02		N/A												C02									

QUESTION 204

WHAT ARE THE TITLES/POSITIONS OF THE INDIVIDUALS REPORTING DIRECTLY TO THE SENIOR ADP OFFICER? (E.G., CHIEF, SOFTWARE DEVELOPMENT DIVISION)

A.----------
B.----------
C.----------
D.----------
E.----------
F.----------
Y.NONE/NOT APPLICABLE TO ORGANIZATION
Z.COMMENT IF NECESSARY

	RESPONDOR																														
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	
01 A	VPO	VPO	VPO	MAD	LOI	FOI	MSO	MSO	MSO	MSO	MSO	MEN	MOS		FSW			CPR	CPR	MSO		MSO	MSO	MSO	MSL	MCE		VPO		MAD	
01 B				MSA	LAP	FOP	MSA	MSA	MSA	MSD	MSD		MSW		FSA			CAN	CAN	MOS		MOS	MOS	MOS	MSS	MSD		VPO		MSA	
01 C				MSA	LOP	FAP	MSA	MSA	MSA				MSD		FOS			COV	COV	MGN		MGN	MGN	MGN	MOS	MSS		VPO		MSA	
01 D				MOS		FIM							MPL		FAN			COP	COP	MGN		MGN	MGN	MGN	MAA	MEF				MOS	
01 E															FSE					MGN		MGN	MGN	MGN							
01 F																				MGN		MGN	MGN	MGN							
01 G																				MGN		MGN	MGN	MGN							
01 X														MIS		N/A	N/A		N/A								MIS		MIS		

	RESPONDOR																														
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	
01 A	VDR	LSW		PMR	MEF			MBA		MPA	MCP		MSD	MSD	MSD	MSD	MSK	FLS	FSW	MEF		OSS	OSS	FLS	FLS	FLS	MOS	MOS		MOS	
01 B	VPO	LSW		PMR	MSD			MSL		MOS	MEN		MSW	MSW	MSW	MSW	MSD	ENG	FEW	MCP		MPI	MPI	FLS	FLS	FLS	MEF	MEF		MAI	
01 C								MIM		MSL			MAI	MAI	MAI	MAI	MIM	FIM	ENG	MAD		MSW	MSW				MSK	MSK		MSD	
01 D													MOS	MOS	MOS	MOS	MAI			MAA		MEF	MEF				MIG	MIG		MSD	
01 E													PMW	PMW	PMW	PMW				OPI		MEF	MEF				MBA	MBA		MSD	
01 F																						MSD	MSD				MAS	MAS		MAD	
01 G																											MPD	MPD			
01 X			N/A			N/A	N/A		N/A			DEL									MIS								N/A		
01 Z	VPO	LSW		PMR									PMW	PMW	PMW	PMW						MEF	MEF	FLS	FLS	FLS					

QUESTION 205

WHAT IS A TYPICAL LINE OF AUTHORITY FROM SENIOR ADP OFFICER (OR SENIOR CORPORATE OFFICER OVER PROJECT) THROUGH SOFTWARE DEVELOPMENT PROJECT MANAGER? (ADDED)

A. SENIOR ADP OFFICER (OR _____)TO
B. ---------- TO
C. ---------- TO
D. ---------- TO
E. ---------- TO
F. ---------- TO
G. ---------- TO
H. (SOFTWARE DEVELOPMENT) PROJECT MANAGER
Y. NOT APPLICABLE TO ORGANIZATIONAL STRUCTURE
Z. COMMENT IF NECESSARY

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	VPD	VPD	VPD	MCP			MCP	MCP	MCP	MLB	MLB	MEN	MCP		MCP						VPE		VPE	VPE	VPE	MCP	MCP		VPD		MCP
01 B	MGR	MGR	MGR	MSD			MCD	MCD	MCD	MGN	MGN	MEN	MGN		MGN						MEN		MEN	MEN	MEN	MGN	FLS		MGR		MSD
01 C				FSD						FLS	FLS	MCD	MCD		FLS														MGN		FSD
01 D																													FLS		
01 F																															
01 H	PMR	PMR	PMR	PMR			PMR	PMR	PMR	PMR	PMR	FSD	FSD		PMR						PMR		PMR	PMR	PMR	PMR	MDR		PMR		PMR
01 X														N/A		N/A	N/A	MIS	MIS		N/A							MIS		MIS	
01 Z				DIR	DIR																										

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	VPD							VDR		MGN	VPE						VPE	MGN	MGN	VDP	MDR	MLB	MLB	MGN	MGN	MGN	VPE	VPE		MCP	
01 B	MEN							MGR			MCP						MEF	FLS	FLS	MCP		MGN	MGN					MGN	MGN		MSD
01 C	MGN							MGN			MSD							LPA	LPA									MAS	MAS		MSD
01 D																															FSD
01 H	PMR							FLS		PGR	PMR	MCP					PMR	PMR	PMR	MSD	MGN	PMA	PMA	FLS	FLS	FLS	PMR	PMR		PMR	
01 X			N/A			N/A	N/A		N/A																						
01 Z		DIR		DIR	DIR											DIR	DIR	DIR	DIR										DIR		

QUESTION 206 SOFTWARE DEVELOPMENT PROJECT MANAGERS ARE NORMALLY:

A. FUNCTIONALLY ORIENTED (ACCOUNTANT FOR ACCOUNTING APPLICATION, LOGISTICIAN FOR LOGISTICS APPLICATION, ENGINEERING, ETC) (ADDED)
B. ADP MANAGEMENT ORIENTED
C. SENIOR SOFTWARE ANALYSIS
D. SENIOR SOFTWARE ANALYSIS/PROGRAMMERS
E. PROFESSIONAL PROJECT MANAGERS (GENERALIST) (ADDED)
Y. NONE OF THE ABOVE (ADDED)
Z. OTHER (ADDED)

RESPONDER

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A															YES	YES														
01 B	YES	YES	YES									YES	YES				YES													
01 C					YES	YES														YES		YES	YES	YES	YES			YES		
01 D				YES			YES	YES	YES	YES	YES			YES				YES	YES		YES					YES				YES
01 X																											MIS		MIS	

RESPONDER

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A		YES	YES	YES		LOS	LOS						YES	YES	YES	YES														
01 B	YES			YES				YES	YES		YES							YES		YES							YES	YES		YES
01 C				YES	YES					YES		YES											YES	YES	YES	YES	YES	YES		
01 D				YES		YES	YES										YES		YES	YES										
01 E				YES																		YES	YES							

QUESTION 207 THE FIRM IS PRIMARILY: (TAKEN PARTLY FROM COMPUTER SURVEY SUBSCRIPTION FORM, 1 JUNE 1977)

A. A MANUFACTURER OF COMPUTER HARDWARE
B. A MANUFACTURER OF OTHER THAN COMPUTER HARDWARE
C. A "SOFTWARE HOUSE"
D. AN ENGINEERING SERVICE AND TECHNICAL SUPPORT ORGANIZATION
E. THE GOVERNMENT: FEDERAL (NON-MILITARY), FEDERAL (MILITARY), STATE, COUNTY, MUNICIPAL
F. A UNIVERSITY OR EDUCATIONAL INSTITUTION
G. A COMPUTER SERVICE BUREAU, TIME SHARING SERVICE
H. AN ADP CONSULTANT AND/OR EDUCATION SERVICE
I. FINANCIAL: BANKING, INSURANCE, REAL ESTATE, SECURITIES, CREDIT
J. IN THE WHOLESALE OR RETAIL TRADE
K. IN MEDICAL OR LEGAL SERVICES
L. IN TRANSPORTATION SERVICES
M. UTILITIES: COMMUNICATION, ELECTRIC, GAS
Z. OTHER: COMMENT:

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A					YES					YES	YES																			
01 B						YES				YES	YES	YES	YES	YES	YES	YES	YES	YES	YES			YES	YES	YES				YES		
01 C	YES	YES	YES																		YES									
01 D	YES	YES	YES				YES	YES	YES																YES					
01 E				YES																				YES					YES	
01 X																											MIS		MIS	

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A																		YES	YES											
01 B	YES				YES				YES	YES	YES			YES	YES	YES	YES	YES	YES	YES		YES	YES							
01 C	YES			YES													YES										YES	YES		
01 D	YES			YES		C03	C03																						YES	
01 E		YES	YES								YES	YES												YES	YES	YES				YES
01 G																											YES	YES		
01 H																											YES	YES		
01 M																					YES									

QUESTION 208

THE FIRM IS:
A. OPERATED FOR A PROFIT
B. NON-PROFIT ORGANIZATION
C. GOVERNMENT AGENCY
Y. NONE OF THE ABOVE (ADDED)
Z. OTHER:

	RESPONDR																											
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES				YES		
01 B																										YES				
01 C				YES																					YES				YES	
01 X																											MIS		MIS	

	RESPONDR																													
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES			YES	YES			YES	YES	YES			YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES				YES	YES	YES	
01 B						YES	YES																	YES	YES	YES				
01 C		YES	YES								YES	YES																		
01 Z																													OTH	

QUESTION 209 THE FIRM HAS ------ PRINCIPAL LOCATIONS. (E.G., FACTORY IN PEORIA, MINE AND SMELTER IN ASHTABULA, HOME OFFICE IN NEWARK: = 3 LOCATIONS)

RESPONDUP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 001	006	006	006	001	001	001	001	001	001	001	001	003	003	002	002	001	003	004	004	001	020	001	001	001	002	001	MIS	004	MIS	001

RESPONDUP

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 001	012	MIS	001	005	018	001	001	003	003	010	011	001	006	006	006	006	012	MIS	002	004	002	011	011	001	001	001	003	003	008	012

QUESTION 210 SOFTWARE SYSTEM DEVELOPMENT IS CARRIED ON AT ------ OF THESE LOCATIONS.

	RESPONDUR																												
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 001	006	006	006	001	001	001	001	001	001	001	001	MIS	002	002	002	001	002	002	002	001	020	001	001	001	001	001	MIS	003	MIS	001

	RESPONDUR																												
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 001	008	MIS	001	005	006	001	001	002	002	009	010	001	002	002	002	002	012	MIS	001	004	002	003	003	001	001	001	003	003	008	007

QUESTION 211

GROSS REVENUES (BUDGET FOR GOVT AGENCIES) FOR LAST YEAR REPORTED (19--) WERE: (ADDED)
A. LESS THAN 200 THOUSAND DOLLARS
B. BETWEEN 200 THOUSAND AND 1 MILLION DOLLARS
C. BETWEEN 1 MILLION AND 10 MILLION DOLLARS
D. BETWEEN 10 MILLION AND 50 MILLION DOLLARS
E. BETWEEN 50 MILLION AND 100 MILLION DOLLARS
F. BETWEEN 100 MILLION AND 500 MILLION DOLLARS
G. BETWEEN 500 MILLION AND 1 BILLION DOLLARS
H. IN EXCESS OF ONE BILLION DOLLARS
Z. OTHER:

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 C				YES																					077						
01 D	YES	YES	YES		YES	YES	YES	YES													077									
01 E									YES	YES				YES																
01 F											YES	076	077		076	076	076		076	076	076		077		077					
01 H			077													YES													YES	
01 X																	MIS										MIS		MIS	

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 D				YES																										
01 E			YES			077	077												076								076	076		
01 F	YES																YES			YES	076		077	077	077			YES		
01 G																						076	076							077
01 H		YES			YES			076		YES	YES	YES	076	076	076	076			076											
01 X									MIS																					

QUESTION 212

WHAT PERCENT OF (TOTAL) REVENUE IS DERIVED FROM SOFTWARE DEVELOPMENT? (FOR SOFTWARE DEVELOPED FOR PROFIT) (ADDED)

A. LESS THAN 10%
B. BETWEEN 10% AND 25%
C. BETWEEN 25% AND 50%
D. BETWEEN 50% AND 75%
E. OVER 75%
F. ALL REVENUE DERIVED FROM SOFTWARE DEVELOPMENT
Y. (NOT APPLICABLE)/ALL DEVELOPMENT DONE FOR IN-HOUSE CUSTOMERS (ADDED)
Z. OTHER:

	RESPONDOR																												
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A									YES	YES	YES	YES	YES					YES	YES	YES		YES		YES	YES	YES	YES	YES		
01 B							YES								YES	YES					YES		YES							
01 C					YES																	YES								
01 E	YES	YES	YES																							MIS	MIS			
01 X																												COL		
01 Y				COL																										

	RESPONDOR																												
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A		YES	YES		YES			YES	YES	YES			YES	YES	YES	YES		YES	YES		YES	YES	YES	YES	YES	YES	YES			YES
01 B																				YES							YES	YES		
01 C																			YES											
01 D	YES																													
01 E				YES																										
01 X						MIS	MIS				MIS	MIS																		

QUESTION 21:

WHAT PERCENT OF THE (TOTAL PROFITS, ANNUAL BUDGET IS DEVOTED TO SOFTWARE DEVELOPMENT ACTIVITIES? (FOR SOFTWARE NOT DEVELOPED FOR PROFIT/GOVERNMENT AGENCIES) (ADDED)
A. LESS THAN 10%
B. BETWEEN 10 AND 25%
C. BETWEEN 25 AND 50%
D. BETWEEN 50 AND 75%
E. OVER 75%
Y. NOT APPLICABLE (ADDED)
Z. COMMENT:

	RESPONDOR																										
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				YES			YES	YES	YES	YES	YES			YES	YES	YES	YES	YES	YES											YES
01 B						YES							YES	YES						YES		YES	YES	YES	YES	YES				
01 C					YES																							YES		
01 D	YES	YES	YES																											
01 X																					MIS					MIS		MIS		

	RESPONDOR																										
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A					YES			YES	YES	YES			YES	YES	YES	YES	YES		YES		YES	YES	YES	YES	YES	YES				YES
01 B		YES	YES								YES									YES							YES	YES		
01 C				YES																									YES	
01 D	YES											YES																		
01 X						MIS	MIS											MIS												

QUESTION 210

HOW MANY PEOPLE:
A. ARE EMPLOYED BY THE FIRM
B. WORK IN ALL ASPECTS OF ADP
C. ARE DEVOTED TO SOFTWARE DEVELOPMENT ACTIVITIES
D. COMMENT:

RESPONDUP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A			153	211	401	102	102	102	162	162	502	502	242	902	143	503	102	102	123	601	123	123	123	172	252		303		133	
01 B			051	101		620	620	620	151	151	251	251		401		102	101	101	162		162	162	162	401	102		352		451	
01 C			300	250	800	310	310	310	151	151	151	151	500	231	901	401	200	200	122	451	122	122	122	201	750		202		300	
01 X	MIS	MIS	MIS																							MIS		MIS		

RESPONDUP

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	502	201	201	351	403	182	182	193	503	603	503	402	203	203	203	203	252	452	502	502	132	353	353	402	402	402	152	152	302	923
01 B	502		251	601	201	201	152	102	202	502	202	351	351	351	351	202		101	800	101	202	202	601	601	601	122	122	102	202	
01 C	202	020	020	151	501	151	151	901	401	401	252	132	151	151	151	151	152	800	750	250	500	102	102	401	401	401	101	101	801	501

QUESTION 215

WHO EXERCISES APPROVAL AUTHORITY FOR MAJOR SOFTWARE DEVELOPED FOR IN-HOUSE USE?

A. CORPORATE OFFICER (PRESIDENT, VICE PRESIDENT, FIC) (ADDED)
B. SENIOR FUNCTIONAL AREA MANAGER (ADDED)
C. COMPTROLLER
D. DIRECTOR OF DATA PROCESSING (SENIOR ADP OFFICIAL) (ADDED)
E. EXECUTIVE ONE STEP ABOVE FUNCTIONAL AREA INVOLVED
F. SELECTION COMMITTEE (ADDED)
G. PROJECT MANAGER (ADDED)
H. EXECUTIVE REQUESTING SYSTEM THROUGH SOME FORM OF INTERNAL BUDGET SCHEME (REQUIREMENT DOCUMENT) (ADDED)
Y. SOFTWARE NOT DEVELOPED FOR IN-HOUSE USE (ADDED)
Z. OTHER:

RESPONDUR PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	YES	YES	YES																		YES									
01 B				C02		C02						C02																C02		C02
01 E													YES	YES																
01 F																C02														
01 G												YES														C02				
01 H					YES		YES	YES	YES	YES	YES				YES		YES	YES	YES	YES		YES	YES	YES	YES					
01 X																											MIS		MIS	

RESPONDUR PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 H	C02										C02																			
01 C										YES																				
01 D								YES		YES									YES	YES		YES	YES							
01 E									YES			YES	YES	YES	YES	YES								YES	YES	YES				
01 G																						C02	C02							
01 H					YES	YES	YES											YES	YES		YES						YES	YES	YES	
01 X			MIS	MIS																										
01 Y				NON																										
01 Z																														OTH

QUESTION 216

IN THIS QUESTION WE WISH TO ASCERTAIN WHICH FORMS OF CONTRACT YOU EMPLOY AND WHICH YOU PREFER IN EACH OF THREE SITUATIONS. IN RESPONDING YOU MAY EITHER CHECK THE ANSWER OR PROVIDE A RANK ORDERING OF THOSE ANSWERS THAT APPLY. THE FIRST SITUATION RELATES TO YOUR BEING THE CONTRACTOR PROVIDING SOFTWARE DEVELOPMENT FOR A USER OR CUSTOMER. THE SECOND SITUATION REVERSES THIS AND PLACES YOU IN THE USER OR CUSTOMER ROLE. THE FINAL SITUATION CONCERNS THE FORM OF AGREEMENT THAT IS EMPLOYED WHEN SOFTWARE IS DEVELOPED FOR IN-HOUSE USERS. (ASPR,1976)

CONTRACT TYPE	YOU ARE CONTRACTOR USE (1)	YOU ARE CONTRACTOR PREFER (2)	YOU CONTRACT FOR USE (3)	YOU CONTRACT FOR PREFER (4)	DEVELOP FOR IN-HOUSE USE (5)	DEVELOP FOR IN-HOUSE PREFER (6)
A. FIRM FIXED PRICE						
B. FIXED PRICE WITH ECONOMIC PRICE ADJUSTMENT						
C. FIXED PRICE INCENTIVE						
D. FIRM FIXED PRICE LEVEL OF EFFORT						
E. COST						
F. COST SHARING						
G. COST PLUS INCENTIVE FEE						
H. COST PLUS AWARD FEE						
I. COST PLUS FIXED FEE						
J. TIME AND MATERIALS						
K. LABOR-HOUR						
L. BASIC ORDERING AGREEMENT						
Y. NONE (ADDED)						
Z. OTHER:						

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	YES	YES	YES	YES	YES									YES		YES				YES	YES	YES	YES	YES		YES		YES		YES
01 B						002										YES														
01 C	YES	YES	YES													YES				YES	YES	YES	YES	YES						
01 D	YES	YES	YES													YES				YES	YES	YES	YES	YES						
01 E				YES												YES														YES
01 F																YES					YES									
01 G	YES	YES	YES													YES				YES	YES	YES	YES	YES						
01 H	YES		YES						004	004						YES				YES	YES	YES	YES	YES						
01 I	YES	YES	YES			001	YES	YES	YES	001	001					YES		YES	YES	YES	YES	YES	YES	YES						
01 J	YES	YES	YES						003	003						YES				YES	YES	YES	YES	YES						
01 K	YES	YES	YES																											
01 L									002	002						YES				YES	YES	YES	YES	YES						
01 X												MIS	MIS		MIS		MIS								MIS					

PART/SUB	RESPONDENT 201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A													YES	YES	YES	YES	YES	002	YES			YES	YES				YES	YES		
01 B																			YES			YES	YES							
01 C																	004		YES			YES	YES				YES	YES		
01 D																						YES	YES							
01 E																											YES	YES	003	YES
01 F																													004	
01 G								YES					YES	YES	YES	YES			YES			YES	YES				YES	YES	002	
01 H													YES	YES	YES	YES	003										YES	YES	006	
01 I						YES	YES						YES	YES	YES	YES	001		YES		YES						YES	YES	001	YES
01 J																	005		YES								YES	YES	005	
01 K																											YES	YES		
01 X	MIS	MIS	MIS	MIS	MIS				MIS	MIS	MIS							MIS		MIS				MIS	MIS	MIS				

RESPONSE

PARTICIPANT	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
04 A				YES	YES	001	001	001	001			001	001								YES					YES		YES		YES
04 C										001	001																			
04 D							002	002	002																					
04 E												003	003							YES		YES	YES							
04 H												002	002							YES		YES	YES		YES					
04 I							003	003	003									YES	YES											
04 J										002	002																			
04 K						002																								
04 X	MIS	MIS	MIS											MIS	MIS	MIS	MIS													

RESPONSE

PARTICIPANT	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
04 A					YES			YES					YES	YES	YES	YES	YES		YES		YES						YES	YES		YES
04 B												YES												YES	YES	YES				
04 E		YES	YES								002											YES	YES				YES	YES		
04 G										002			YES	YES	YES	YES	YES													
04 H											001																			
04 I	YES									001																			YES
04 J	YES																													
04 X				MIS		MIS	MIS		MIS									MIS		MIS								MIS		

QUESTION 217

DO YOU USE TWO PHASE CONTRACTS IN WHICH PHASE ONE ANALYZES THE REQUIREMENTS, DETERMINES FEASIBILITY, AND ESTIMATES COSTS, AND PHASE TWO DIRECTS DEVELOPMENT?

	YOU ARE CONTRACTOR (1)	YOU CONTRACT FOR (2)	DEVELOP FOR IN-HOUSE USE (3)
A. ALWAYS USE THEM			
B. PREFER THEM ON PROJECTS OF ANY SIZE			
C. ENCOURAGE THEIR USE ON MAJOR PROJECTS			
D. SOMETIMES USE THEM (ADDED)			
E. HARDLY EVER USE THEM (ADDED)			
F. DISCOURAGE THEIR USE IN ALL BUT EXTREME CASES			
Y. NEVER USE THEM			
Z. COMMENT:			

DISPOSOP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																													YES	
01 B								YES	YES	YES	YES	YES	001	001	YES			YES	YES	YES	YES	YES	YES	YES							
01 C	YES	YES	YES		YES	YES					002	002			YES									YES						
01 X														MIS	MIS										MIS	MIS	MIS				
01 Y				NON																								NON		

DISPOSOP

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A					YES	YES	YES														YES	YES								
01 B											YES														YES	YES	YES	YES	YES	YES
01 C	YES		YES					YES		YES																				
01 D												C02	C02	C02	C02															
01 X		MIS	MIS						MIS	MIS								MIS	MIS	MIS	MIS									NON
01 Y																	NON													

PLSP0000P

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A																												YES		
02 B							YES	YES	YES	YES	YES	001	001	YES				YES	YES	YES		YES	YES	YES	YES					
02 C					YES							002	002			YES										YES				
02 I						YES																								
02 X	MIS	MIS	MIS												MIS		MIS										MIS		MIS	
02 Y				NON																	NON									NON

PLSP0000P

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A					YES																									
02 B																	YES													
02 C		YES						YES		YES	YES	YES									YES	YES	YES	YES	YES	YES	YES	YES	YES	
02 D													CO2	CO2	CO2	CO2														
02 X			MIS	MIS					MIS									MIS	MIS	MIS										
02 Y	NON					NON	NON																							NON

RESPONDOP

PARTSOB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
05 A				YES																								YES		YES
05 B							YES	YES	YES	YES	YES	001	001	YES				YES	YES	YES		YES	YES	YES	YES					
05 C					YES	YES						002	002			YES										YES				
05 X	MIS	MIS	MIS												MIS		MIS										MIS		MIS	
05 Y																					NON									

RESPONDOP

PARTSOB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
05 A					YES	YES	YES	YES		YES																	YES	YES		
05 C											YES										YES			YES	YES	YES				
05 D													C02	C02	C02	C02													YES	
05 X		MIS	MIS	MIS					MIS									MIS	MIS	MIS										
05 Y	NON											NON					NON					NON	NON						NON	

QUESTION 218 — IF AN INCENTIVE CLAUSE IS INCLUDED IN THE CONTRACT, WHAT IS THE INCENTIVE NORMALLY BASED ON?

YOU ARE CONTRACTOR (1) — YOU CONTRACT FOR (2) — DEVELOP IN-HOUSE FOR USE (3)

A. REDUCED COST
B. EARLY DELIVERY
C. INCREASED PERFORMANCE
D. QUALITY FACTORS
Y. NOT USED (ADDED)
Z. OTHER

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	YES	YES	YES			YES						YES	YES				YES			YES	YES	YES	YES	YES						
01 B	YES	YES	YES							YES	YES			YES						YES	YES	YES	YES	YES				YES		
01 C																	YES			YES		YES	YES	YES						
01 D																				YES		YES	YES	YES						
01 X															MIS												MIS		MIS	
01 Y				C01	C01			C01	C01	C01						C01		C01	C01						C01	C01				C01

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES				YES				YES				YES	YES	YES	YES						YES	YES	YES	YES	YES	YES	YES		
01 B	YES				YES			YES					YES	YES	YES	YES	YES		YES			YES	YES				YES	YES		
01 C									YES													YES	YES				YES	YES	YES	
01 D				YES																		YES	YES				YES	YES	YES	
01 X																		MIS		MIS										
01 Y		C01	C01			C01	C01			C01	C01	C01									C01									C01

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A						YES						YES	YES	YES						YES	YES	YES	YES	YES				YES		
02 B																				YES		YES	YES	YES	YES					
02 L														YES						YES		YES	YES	YES						
02 D										YES	YES									YES		YES	YES	YES	YES					
02 X															MIS												MIS		MIS	
02 Y	C01	C01	C01	C01	C01		C01	C01	C01							C01	C01	C01	C01							C01				C01

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A		YES	YES		YES			YES		YES	YES		YES	YES	YES	YES	YES					YES	YES	YES	YES	YES	YES	YES		
02 B			YES		YES			YES		YES			YES	YES	YES	YES						YES	YES				YES	YES		
02 L											YES											YES	YES				YES	YES	YES	
02 D											YES											YES	YES				YES	YES	YES	
02 X																		MIS		MIS										
02 Y	C01			C01		C01	C01			C01			C01						C01		C01									C01

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
05 B														YES											YES					
05 C												YES	YES																	
05 D																									YES		YES			
05 X															MIS												MIS		MIS	
05 Y	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01						C01	C01	C01	C01	C01	C01	C01	C01	C01		C01		C01	

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
05 A					YES														YES					YES	YES	YES	YES	YES			
05 B					YES												YES										YES	YES		
05 C																											YES	YES		
05 D																											YES	YES		
05 X																		MIS		MIS										
05 Y	C01	C01	C01	C01		C01	C01	C01	C01	C01	C01	C01	C01	C01	C01	C01					C01	C01	C01						C01	C01

QUESTION 219 ARE BONUSES OR INCENTIVES PAID FOR EARLY/ON TIME COMPLETION OF SOFTWARE DEVELOPMENT PROJECTS?

A. YES, FOR KEY PERSONNEL
B. YES, FOR OTHER THAN MANAGEMENT POSITIONS
C. YES, FOR ALL INDIVIDUALS ENGAGED FULL TIME ON THE PROJECT
D. YES, TO PROJECT MGR ON FIXED PRICE CONTRACTS (ADDED)
F. YES, BASED ON INDIVIDUAL PERFORMANCE (ADDED)
F. YES, MANAGEMENT INCENTIVE PROGRAM (ADDED)
G. YES, HIGHER AWARD FEE ON CONTRACT (ADDED)
Y. NO BONUSES OR INCENTIVES WERE PAID (ADDED)
Z. OTHER:

RESPONDOP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																					YES		YES	YES	YES					
01 C																									YES					
01 D																					C02									
01 X																										MIS	MIS		MIS	
01 Y	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON									NON		NON

RESPONDOP

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES				YES					YES																	YES	YES		
01 C		YES																												
01 F				C02																C02										
01 F								C02																						
01 G											C02																			
01 X			MIS															MIS												
01 Y						NON	NON		NON			NON	NON	NON	NON	NON	NON		NON		NON	NON	NON	NON	NON	NON			NON	NON

HAVE PROCEDURES BEEN EMPLOYED IN WHICH PROGRAMMERS OR ANALYSTS BID ON SPECIFIC TASKS IN THE DEVELOPMENT OF PROJECTS? E.G., "I'LL WRITE THE EDIT PROGRAM FOR $1,217.12."

A. YES
B. NO
Z. COMMENT:

RESPONDOR																												
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																				YES		YES	YES	YES	YES			YES		
01 B	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		YES					YES				YES
01 X																											MIS		MIS	

RESPONDOR																														
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A					YES			YES										YES												
01 B	YES	YES		YES		YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
01 X			N/A																											

QUESTION 224 — IF BIDDING AS DESCRIBED ABOVE WAS EMPLOYED, HOW SUCCESSFUL HAS IT PROVEN TO BE?

A. VERY
B. MODERATE
C. UNSUCCESSFUL
Y. NOT EMPLOYED
Z. USEFUL ONLY UNDER THE FOLLOWING CONDITION(S)

PART/SUB	RESPONDOR 101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																				YES		YES	YES	YES	YES			YES		
01 B														YES						YES		YES	YES	YES						
01 X																											MIS		MIS	
01 Y	NON	NON	NON	NON	COI	COI	NON	NON	NON	NON	NON	NON	NON		NON	COI	N/A	COI	COI		NON					NON				NON

PART/SUB	RESPONDOR 201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A								YES										YES												
01 B								YES																						
01 C					YES																									
01 X			N/A																											
01 Y	NON	COI		COI		NON	NON		N/A	COI	NON	NON	NON	NON	NON	NON	NON		NON	N/A	COI	NON	NON	COI	COI	COI	COI	COI	COI	NON

QUESTION 222

IN MOST INSTANCES:
A. SOFTWARE DEVELOPMENT PROJECTS ARE HANDLED WITHIN THE ADP ENVIRONMENT WITH FUNCTIONAL ANALYSTS OR PROSPECTIVE USERS BEING ASSIGNED OR ATTACHED TO THE DEVELOPMENT TEAM.
B. ADP SPECIALISTS ARE DETAILED OR ASSIGNED TO THE FUNCTIONAL USER FOR THE DURATION OF THE DEVELOPMENT EFFORT.
Y. NONE OF THE ABOVE (ADDED)
Z. OTHER.

	RESPONDR																										
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	YES	YES	YES	YES	YES					YES	YES				YES		YES			YES	YES	YES	YES	YES	YES			YES		YES
01 B						YES	YES	YES	YES			YES	YES	YES	YES	YES		YES	YES							YES		YES		
01 X																											MIS		MIS	

	RESPONDR																										
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES			YES	YES	YES	YES	YES	YES	YES	YES	YES					YES	YES	YES		YES						YES	YES	YES	YES
01 B		YES	YES			YES	YES				YES		YES	YES	YES	YES				YES		YES	YES	YES	YES	YES	YES	YES		

QUESTION 225

TEAMS ARE TYPICALLY MADE UP OF:
A. PERMANENT EMPLOYEES ------%
B. TEMPORARY HIRES EMPLOYED FOR DURATION OF PROJECT ------%
C. CONSULTANTS HIRED AT DAILY/WEEKLY/MONTHLY RATE -------%
Z. OTHER:

RESPONDOP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	100	100	100	100	090	080	100	100	100	085	085	100	100	075	100	100	097	100	100	100	095	100	100	100	100	090		100		100
01 B						005								025			003									010				
01 C					010	015				015	015										005									
01 X																											MIS		MIS	

RESPONDOP

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	100	100	100	100	100			098	097	090	100	080	100	100	100	100	099	100	090	098	100	090	090	070	070	070	095	095	098	100
01 B									003	003		010								002				030	030	030	005	005		
01 C								002		007		010						001		010			010	010					002	
01 X						MIS	MIS																							

QUESTION 224

IF POSSIBLE, OUTLINE THE COMPOSITION OF A TYPICAL LARGE DEVELOPMENT TEAM AS IT WOULD BE EMPLOYED IN YOUR FIRM. TO PLACE THE TEAM IN CONTEXT A HYPOTHETICAL PROJECT DESCRIPTION MAY BE INCLUDED (E.G., DEVELOPMENT OF AN ON-LINE AIR CARGO MANIFESTING CAPABILITY.)
HYPOTHETICAL PROJECT DESCRIPTION (OPTIONAL):----------
FRACTIONS MAY BE USED TO INDICATE THAT THE POSITION IS NOT CONSIDERED A FULL TIME JOB. THE FOLLOWING IS AN EXAMPLE OF THE NOTATION TO BE USED IF ONE INDIVIDUAL OCCUPIES MORE THAN ONE POSITION.
F. ADMINISTRATOR----------1/3 (G)
G. LIBRARIAN - DESIGN ASSISTANT----------2/3 (F)
THE LETTER IN PARENTHESIS IS INTENDED TO TIE THE SAME INDIVIDUAL TO POSITIONS F AND G.

POSITION TITLE	TITLE USED BY FIRM(1)	NUMBER(2)
A.	PROJECT MANAGER	
B.	ASST. PROJ. MGR.	
C.	SENIOR ANALYST	
D.	TEAM CHIEF	
E.	ASST. TEAM CHIEF	
F.	ADMINISTRATOR	
G.	LIBRARIAN	
H.	APPLICATION ANAL.	
I.	FUNCTIONAL ANAL.	
J.	APPLICATIONS PROG.	
K.	OPER. SYS. PROG.	
L.	TESTER	
M.	INTEGRATOR	
N.	DATA BASE DESIGNER (ADDED)	
O.	DATA BASE ADMINISTRATOR (ADDED)	
P.	TRANSITION TO PRODUCTION INTERFACE (ADDED)	
Q.	QUALITY ASSURANCE (ADDED)	
R.	STAFF ASSIGNMENT TO ASST. PROJ. MGR. (ADDED)	
S.	DOCUMENTATION AIDS (ADDED)	
T.	HARDWARE ENGINEERS (ADDED)	
Y.	NONE OF THE ABOVE (ADDED)	
Z.	OTHER	

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	PMP	PMP	PMP	SAM		SAM	SAM	SAM	SAM	SAM	SAM	FSW	MCP		PEN		MSW			SAM	SAM	SAM	SAM	SAM	SAM	SAM		MPD		SAM
01 B	PID	PID	PID	SAM		SAM	SAM	SAM	SAM				MGN							SAM	SAM	SAM	SAM	SAM	SAM			MPA		SAM
01 C					SAM	SAM	SAM	SAM	SAN	ISC	ISC	ISP	ISF								ISS									
01 D	MGN	MGN	MGN	SAM		PEN				ISF	ISF						FSW			FLS	PMA	FLS	FLS	FLS	SAM					SAM
01 E	FLS	FLS	FLS																						SAM					
01 I	SAM	SAM	SAM	SAM	SAM	SAM							SAM							SAM	SAM	SAM	SAM	SAM						SAM
01 G	SAM	SAM	SAM	SAM						SAM	SAM									SAM	SAM	SAM	SAM	SAM						SAM
01 H						ENS	CPA	CPA	CPA			SAM	SAM		FSP					SAM	FSA	SAM	SAM	SAM						
01 I	SAM	SAM	SAM	SAM											FLS															SAM
01 J	SAM	SAM	SAM	SAM	SAM	CSP	CDT	CDT	CDT	CPR	CPP		SAM		CSP					CPA	SAM	CPA	CPA	CPA		SAM				SAM
01 K	SAM	SAM	SAM		SAM		CDT	CDT	CDT				SAM								CSY					FSS				
01 L				SAM									SAM								SAM									SAM
01 M																					SAM									
01 O																				SAM		SAM	SAM	SAM						
01 T						SAM																								
01 X														MIS				MIS	MIS								MIS		MIS	
01 Z																VAR														

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	SAM			SAM	MPD	MPD	MPD		MSW	SAM		FLS	MEN	MEN	MEN	MEN	SAM		SAM		WMT	MGR	MGR	ECO	ECO	ECO	SAM	SAM	MPD	SAM
01 B	SAM			SAM		PEN	PEN			CDS			PEN	PEN	PEN	PEN			SAM			MPA	MPA	ECO	ECO	ECO	FLS	FLS	MPA	SAM
01 C	SAM			PID	SAM	PID	PID				SAM	CDA	PMR	PMR	PMR	PMR	LSD		SAM	SAM	WMT	PEN	PEN				FIC	FIC	PMF	
01 D	MGN				FPP	FLS	FLS		FSW	LPA	OMG		FLS	FLS	FLS	FLS	FLP		SAM			FLS	FLS				LSP	LSP	PMC	
01 E											CSA								SAM			WMT	WMT						FLS	
01 F	SAM			SAM	SAM	SAM	SAM			SAM			SAM	SAM	SAM	SAM			SAM								SDA	SDA	SPC	
01 G				SAM						SAM			FSW	FSW	FSW	FSW						SAM	SAM				SAM	SAM	CMS	
01 H				SAM							CSN		CSA	CSA	CSA	CSA	FDG		SAM	SAM		WMT	WMT	ENG	ENG	ENG			ENS	
01 I				SAM									CSA	CSA	CSA	CSA								ENG	ENG	ENG	SAM	SAM	SAM	
01 J	CAP			SAM	SAM	CPR	CPR			CPA	CPA		FDS	FDS	FDS	FDS	CPR				WMT	WMT	WMT	CPR	CPR	CPR	SAM	SAM	SAM	SAM
01 K				SAM						CPA	FSS	CPR																		
01 L				SAM						SAM			SAM	SAM	SAM	SAM						SAM	SAM	ENG	ENG	ENG			ENT	
01 M				SAM						SAM			SAM	SAM	SAM	SAM							SAM	SAM	SAM	SAM	SAM	FIG	SAM	
01 N																											SAM	SAM		
01 O																											SAM	SAM		
01 P																											SAM	SAM		
01 R													WDR	WDR	WDR	WDR														
01 S										SAM																				
01 T						ENG	ENG																							
01 X		MIS							MIS										MIS											
01 Y			FLS										ESP																	

RESPONDUR

PARTASS	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A	001	001	001	001		001	001	001	001	001	001	001	001		001		001			001	001	001	001	001	0.5	0.5		001		001
02 B	001	001	001	001		001	002	002	002				002							003	001	003	003	003	0.5			003		001
02 C					001	001	006	006	006	0.3	0.3	002	004								002										
02 D	003	003	003	003		004				001	001						004			006	005	006	006	006	0.5					003
02 F	007	007	007																						0.5					
02 F	001	001	001	001	0.5	002							0.5							001	001	001	001	001						001
02 G	001	001	001	001						001	001									001	001	001	001	001						001
02 H						006	005	005	005			005	010		001					005	004	005	005	005						
02 I	005	005	005	005											0.5															005
02 J	020	020	020	008	002	005	002	002	002	012	012		030		005					015	020	015	015	015		001				008
02 K	005	005	005		2.5		002	002	002				005								008					002				
02 L				001									007								006									001
02 M																					006									
02 N																				SAM		001	001	001						
02 I						010																								
02 X														MIS				MIS	MIS								MIS		MIS	
02 Z																VAR														

RESPONDER

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A	001			001	001	001	001		001	001		001	001	001	001	001	001		001		0.3	001	001	001	001	001	001	001	001	001
02 B	001					001	001			003			002	002	002	002			001			001	001	001	.1	001	002	002	001	001
02 C	011			001	002	001	001				0.5	MIS	003	003	003	003	001		003	004	0.3	004	004				003	003	001	005
02 D	003			005	008	MIS	MIS		004	006	MIS		008	008	008	008	001		002			002	002				003	003	001	
02 E											0.5								002			003	003						010	
02 F	001			001	001	001	001			0.5			001	001	001	001			001								1.5	1.5	002	
02 G				001						001			0.5	0.5	0.5	0.5						004	004				0.7	0.7	002	
02 H				003							001		003	003	003	003	001		016	002		010	010	0.3	0.3	0.3			008	
02 I				003									008	008	008	008								0.3	0.3	0.3	006	006	008	
02 J	020			020	008	MIS	MIS			020	002		015	015	015	015	003				3.3	015	015	MIS	MIS	MIS	015	015	010	020
02 K				008						009	.25	MIS																		
02 L				005						006			012	012	012	012						003	003	0.3	0.3	0.3			003	
02 M				005						003			011	011	011	011								MIS	MIS	MIS	001	001	003	001
02 N																											001	001		
02 O																											002	002		
02 P																											001	001		
02 R													002	002	002	002														
02 S										003																				
02 T						MIS	MIS																							
02 X		MIS							MIS									MIS												
02 Y			001									MIS																		

QUESTION 22b

WHAT IS THE NORMAL/TYPICAL PROGRESSION TO THE POSITION OF PROJECT MANAGER. E.G., PROGRAMMER, ANALYST, LEAD PROGRAMMER, PROJECT MANAGER? (INDICATE BY PUTTING NUMBER OPPOSITE POSITION USED IN ORDER OF PROGRESSION STARTING WITH "1" ON LOWEST POSITION AND ENDING WITH PROJECT MANAGER)) (ADDED) (ORIGINALLY NARRATIVE)

A. ASSOCIATE PROGRAMMER
B. JUNIOR PROGRAMMER/ANALYST
C. JUNIOR ANALYST
D. WORK UNIT LEADER
E. ASSISTANT ENGINEER
F. SOFTWARE ENGINEER
G. ASSOCIATE ENGINEER
H. PROGRAMMER
I. ASSOCIATE PROGRAMMER/ANALYST
J. SENIOR PROGRAMMER
K. SYSTEMS ANALYST
L. PROGRAMMER/ANALYST
M. LEAD ANALYST
N. LEAD ENGINEER
O. CHIEF AVIONICS ENGINEER
P. LEAD PROGRAMMER
Q. STAFF PROGRAMMER/ANALYST
R. HEAD PROGRAMMER
S. SENIOR PROGRAMMER/ANALYST
T. TASK/WORK PACKAGE MANAGER
U. ENGINEER
V. TEAM CHIEF
W. SENIOR SYSTEMS ANALYST
AA. DATA SYSTEMS SPECIALIST
BB. SUPERVISOR
CC. DEPARTMENT HEAD
DD. CHIEF ENGINEER
EE. SENIOR ENGINEER
FF. SOFTWARE SYSTEMS ENGINEER
GG. SOFTWARE DEVELOPMENT MANAGER
HH. DEPUTY/ASSOCIATE PROJECT MANAGER
II. SCIENTIFIC PROGRAMMING SPECIALIST
JJ. GROUP LEADER/SOFTWARE DEVELOPMENT
KK. ADVISORY ANALYST
LL. PROJECT LEADER
MM. PROJECT ENGINEER
NN. FIRST LINE SUPERVISOR
OO. SECOND LINE MANAGER
PP. ENGINEERING MANAGER
QQ. PROJECT MANAGER
Y. NO PATTERN
Z. OTHER

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 BB																	003													
01 CC	003	003	003																											
01 FF										003	003																			
01 G										001	001																			
01 H	001	001	001		001								001	001			001								001					
01 HH							004	004	004											003	005	003	003	003						
01 I																					001							001		
01 K							001	001	001			001	002	002																
01 L				001	002	001	002	002	002									001	001	001	002	001	001	001				002		001
01 LI																												004		
01 M						002																								
01 MM						003				004	004																			
01 N																	002													
01 P	002	002	002	002										003															002	
01 QQ	004	004	004	003	003	004	005	005	005	005	005	003	004	004			004	003	003	004	006	004	004	004	003				003	
01 R																									002					
01 S							003	003	003												003							003		
01 T																		002	002	002	004	002	002	002						
01 U										002	002																			
01 W												002	003																	
01 X																										MIS		MIS		
01 Y															NON										NON					
01 Z																HIH														

01 SPONSOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 AA										003																				
01 A	001																													
01 AA									003																					
01 C																				001										
01 D																													001	
01 DD		003																												
01 E													001	001	001	001														
01 EE													004	004	004	004														
01 F		001																												
01 FF																								004	004	004				
01 G								001					002	002	002	002														
01 GG																				004				005	005	005			002	
01 H					001			002	001		001	001						001		001			001	001	001	001	001			
01 HH																						003	003						003	
01 I	002																													
01 II								005																						
01 J					002			003														002	002	002	002	002				
01 JJ								006					005	005	005	005														
01 K											002	002								002							001	001		

```
01 KK  004                          004   001             002                                         001
01 L                                          004   006 006 006 006
01 LL                                               007 007 007 007
01 MM                                  002
01 N
01 NN  005
01 O      002
01 OO  005                                                      003   002                               002
01 P              003                                  008 008 008 008
01 PP
01 Q   004          001 001                                           004 005 002 004 004 006 006 006 003 003 004 003
01 QQ  006 004   004 004 004 007 004 004 005 003 009 009 009 009 004
                                                                      003
01 R
01 S   003          002 002    002                                         001
01 T                003 003                                                        003 003 003
01 U                                       003 003 003 003                                    002 002
01 V                                                                     003
01 W                                  003                           011
01 Z         018 018
```

QUESTION 22a

ARE APPLICATIONS ANALYSTS ALSO COMPUTER PROGRAMMERS?
A. ALWAYS
B. MORE THAN HALF OF OUR ANALYSTS ARE ALSO PROGRAMMERS
C. LESS THAN HALF OF OUR ANALYSTS ARE ALSO PROGRAMMERS
D. VERY RARELY IS AN ANALYST ALSO A PROGRAMMER
E. VARIES DEPENDING ON TYPE OF WORK (ADDED)
Z. COMMENT?

RESPONDOR / PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				YES	YES		YES	YES	YES	YES	YES																YES		YES		YES
01 B	YES	YES	YES											YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES					
01 C						YES					YES																			
01 E															YES															
01 I																										MIS		MIS		
01 X																														
01 Z																OTH														

RESPONDOR / PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES			YES	YES			YES		YES		YES						YES		YES										YES
01 B			YES						YES		YES								YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	
01 D																														
01 E													YES	YES	YES	YES														
01 X		MIS																												

QUESTION 227 WHAT IS YOUR APPROXIMATE RATIO BETWEEN STRAIGHT PROGRAMMERS AND ANALYSTS (PROGRAMMER/ANALYSIS)? (FILL IN NUMBER OPPOSITE A OR B TITLE TO INDICATE RATIO) (ADDED) (ORIGINALLY NARRATIVE)

A. PROGRAMMERS
B. ANALYSTS/ANALYST PROGRAMMERS
C. VARIES, DEPENDING ON SITUATION
Y. NONE/VERY FEW STRAIGHT PROGRAMMERS OR ANALYSTS (ADDED)
Z. COMMENT

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				000	002	003	001	001	001	001	001	1.5	*.5	002	001			001	001	000	010	000	000	000	001			001		000
01 B				001	001	001	003	003	003	001	001	001	001	001	010			001	001	001	001	001	001	001	010			013		001
01 C																VAR	VAR									VAR				
01 X																											MIS		MIS	
01 Y	C01	C01	C01																											

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	000			1.5	003			001		004	001	002	001	001	001	001		000	002	000	000	003	003	001	001	001	001	001	004	000
01 B	001			001	001			2.3		001	004	001	001	001	001	001		001	001	001	001	001	001	002	002	002	1.5	1.5	001	001
01 C		VAR	VAR						VAR								VAR													
01 Y						C01	C01																							

QUESTION 228

WHICH MANUAL REPORTING PROCEDURES ARE USED IN PROJECT MONITORING AND MANAGEMENT? AT WHAT LEVEL DO THEY ORIGINATE, AND HOW HIGH DO THEY GO? HOW OFTEN ARE THEY AGGREGATED, CONDENSED, OR EDITED AS THEY MOVE THROUGH THE CHAIN?

REPORT TITLE	LOWEST(1) ORIGINATOR	HIGHEST(2) RECIPIENT	NO. OF(3) AGGS/EDITS
A.WEEKLY ACTIVITY			
B.PROJ. STATUS			
C.SIGNIFICANT CHG			
D.----------			
E.----------			
Y.NO MANUAL REPORTING SYSTEM USED.			
Z.COMMENTS			

RESPONDOP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	FLS	FLS	FLS		CPR	ENG	CPA	CPA	CPA	CPR	CPR	FSW	ENG		WOR		LSF			CPA	FLS	CPA	CPA	CPA		WOR		FLS		
01 B	PMR	PMR	PMR	LPA	CPR	LSP	CPA	CPA	CPA	PEN	PEN	FSW	ENG		OCH		MSD			CPA	FLS	CPA	CPA	CPA	YES	WOR		PMR		LPA
01 C					CPR	LSP	CPA	CPA	CPA			MSD	ENG				MSD			CPA	FLS	CPA	CPA	CPA		WOR		PMR		
01 X														MIS		VAR											MIS		MIS	
01 Y																		NON	NON											

RESPONDOP

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	CPR				CPR	WOR	WOR	FSF	LSF		PMR							PMR	FLS	CPR	LSA	WMT	FLS	FLS				FLS	FLS	WOR	CPR
01 B	PMR				CPR	FLS	FLS		MSD		PMR		FLS	FLS	FLS	FLS	LSP	CPR	LSP	MCP	PMR	FLS	FLS	ENG	ENG	ENG	FLS	FLS	WOR	CPR
01 C					CPR				MSD	LPA	PMR		FLS	FLS	FLS	FLS	PMR			MCP	PMR	FLS	FLS	ENG	ENG	ENG	OCH	OCO	PMR	
01 X		MIS	N/A																											
01 Y											NON																PMR	PMR		
01 Z				PAM																										

RESPONDOP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A	PMR	PMR	PMR		MGN	MGN	PMR	PMR	PMR	PMR	PMR	MSD	MCP				PMR			PMR	MGN	PMR	PMR	PMR		PMR		VPO		
02 B	VPO	VPO	VPO	MCP	MGN	MGN	PMR	PMR	PMR	MGR	MGR	PMR	MCP				PMR			PMR	MGN	PMR	PMR	PMR	YES	PMR		VPO		MCP
02 C					MSD	MEN	PMR	PMR	PMR			PMR	MCP				PMR			PMR	MGN	PMR	PMR	PMR		PMR		VPO		
02 X														MIS	MIS	VAR											MIS		MIS	
02 Y																		NON	NON											

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A	PMR				PMR	PMR	PMR	MCP	PMR		MCP						VPG	MEN	VPG	MCP	PMR	PMR	PMR				MGN	MGN	MGR	MCP
02 B	VPO				PMR	OCH	OCH		PMR		MCP		OCH	OCH	OCH	OCH	VPG	PMR	VPG	VOP	VPG	PMR	PMR	FLS	FLS	FLS	VPF	VPF	MGR	MCP
02 C					PMR				PMR	MGN	MCP		OCH	OCH	OCH	OCH	VPG			VOP	VPG	PMR	PMR	FLS	FLS	FLS	OTH	OTH	MGR	
02 X		MIS	N/A																											
02 Y												NON																		
02 Z				VAR																							VPG	VPG		

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
03 A	001	001	001		003	003	002	002	002	000	000	000					004				001							003		
03 B	002	002	002	000	003	003	002	002	002	002	002	003					002				001							001		000
03 C					002	002	002	002	002			004					002				001							001		
03 X													MIS	MIS	MIS	VAR				MIS		MIS	MIS	MIS	MIS	MIS	MIS		MIS	
03 Y																		NON	NON											

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
03 A	002					000	000	002	004		000						MIS	003	005	VAR	000	002	002				002	002	006	002
03 B	005					002	002		002		000		001	001	001	001	003	002	004	VAR	001	002	002	001	001	001	002	002	006	004
03 C									002		000		001	001	001	001	MIS			VAR	MIS	001	001	001	001	001	001	001	004	
03 X		MIS	N/A	MIS	MIS					MIS																				
03 Y												NON																		
03 Z																											001	001		

QUESTION 229 WHICH AUTOMATED REPORTING SYSTEMS ARE USED IN PROJECT MONITORING AND MANAGEMENT?

LOWEST(1) ORIGINATOR — HIGHEST(2) RECIPIENT

A.MANHOUR BY ACTIVITY (E.G., CODE, FLOW DIAGRAM, ETC.)
B.MAN DAY BY TASK (E.G., PREPARE USERS GUIDE, DESIGN DATA BSE ETC.)
C.----------
D.----------
Y.NO AUTOMATED REPORTING SYSTEMS USED.
Z.COMMENTS.

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				CPR		IPA	CPA	CPA	CPA	SLT	SLT	FSW	ENG			WOR	VAR		YES	YES										CPR
01 B				CPR			CPA	CPA	CPA	CPR	CPR	ISP	ENG				VAR				CPA		CPA	CPA	CPA					CPR
01 X																												MIS		MIS
01 Y	NON	NON	NON		NON									NON			NON									NON		NON		
01 Z																					WOR			OTH						

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A								WOR		SAD		YES							YES									ISP	ISP		CPR
01 B				VAR		WOR	WOR											LSP											WOR	
01 X		MIS	N/A		MIS														MIS											
01 Y	NON								NON											NON	NON	NON	NON	NON	NON	NON				
01 Z											VAR		WOR	WOR	WOR	WOR														

RESPONDUR																												
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A				MCP		MEN	PMR	PMR	PMR	MGN	MGN	MCP	MGN		FLS	VAR														MCP
02 B				MCP			PMR	PMR	PMR	PMR	PMR	FSW	MGN			VAR				PMR		PMR	PMR	PMR						MCP
02 X																		MIS	MIS								MIS		MIS	
02 Y	NON	NON	NON		NON									NON			NON									NON		NON	
02 Z																					MGR				OTH					

RESPONDUR																														
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A								VAR		PMR																	PMR	PMR		MCP
02 B				VAR		PMR	PMR					YES					PMR												PMR	
02 X		MIS	N/A		MIS													MIS	MIS											
02 Y	NON								NON											NON	NON	NON	NON	NON	NON	NON				
02 Z											MCP		OCH	OCH	OCH	OCH														

QUESTION 230

WHICH COMMERCIAL, OR WHAT LOCALLY DEVELOPED SOFTWARE IS EMPLOYED TO ASSIST IN THE DEVELOPMENT TASK? (E.G., LIBRARIAN, APPLIED DATA RESEARCH) (IF SYSTEM IS OF LOCAL ORIGIN GIVE VERY BRIEF DESCRIPTION E.G., STRUCTURED PRE-COMPILERS, AUTOMATIC FLOWCHARTERS, ETC.)

	NAME(1)	VENDOR, OR IF LOCALLY DEVELOPED, GIVE BRIEF DESCRIPTION. (2)
A.		
B.		
C.		
D.		
E.		
F.		
G.		
H.		
I.		

Y.NO COMMERCIAL OR LOCALLY DEVELOPED SOFTWARE EMPLOYED TO ASSIST IN DEVELOPMENT TASKS.

Z.COMMENTS

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A	THR	THR	THR				BUG	BUG	BUG	ASS	ASS	PRO	PRO		MAT	VAR	VAR	SPR	SPR	REQ	GEN	REQ	REQ	REQ	SPX	CSS			
01 B	AFL	AFL	AFL				DOC	DOC	DOC	FAI	FAI				NAS					PDL		PDL	PDL	PDL		FSC			
01 C	SPR	SPR	SPR				AFL	AFL	AFL						APT					RCT		RCT	RCT	RCT		ASS			
01 D							FST	FST	FST											CFM		CFM	CFM	CFM		TSO			
01 E							PRT	PRT	PRT											PRC		PRC	PRC	PRG					
01 F																				SIA		SIA	SIA	SIA					
01 G																				TXF		TXF	TXF	TXF					
01 H																				TET		TET	TET	TET					
01 X																									MIS		MIS	MIS		
01 Y				NON	NON	NON									NON											NON				

	RESPONDER																									
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	LIR			VAR				SPR	VAR	TxF	TxF		COM	COM	COM	COM	NLT		ALT	OPR		COM	COM	DSE	DSE	DSE	THS	THS	SPR	TRL
01 B	ALT									ALT	RLT		ASS	ASS	ASS	ASS			TxF	THS		OPR	OPR	SPR	SPR	SPR	LIR	LIR	TxF	
01 C										COM	COM		FAI	FAI	FAI	FAI						OIF	OIF	ALT	ALT	ALT	OPR	OPR	CEM	
01 D											S/O		MON	MON	MON	MON								OIL	OIL	OIL	OIL	OIL		
01 E													FAU	FAU	FAU	FAU														
01 X		MIS	N/A			MIS	MIS					MIS						UNK			NON									
01 Y					NON																						VAR	VAR	OIL	
01 /											SSM																			

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A	CSC	CSC	CSC				INH	INH	INH	INH	PRO	PRO	PRO		INH	VAR	VAR	TBM	TBM	TRW	INH	TRW	TRW	TRW	CSC	TBM				
02 B	CSC	CSC	CSC				INH	INH	INH	INH	INH				CSC					CFG		CFG	CFG	CFG		FED				
02 C	CSC	CSC	CSC				INH	INH	INH						TTT					TRW		TRW	TRW	TRW		INH				
02 D							FST	FST	FST											TRW		TRW	TRW	TRW		TBM				
02 E							INH	INH	INH											TRW		TRW	TRW	TRW						
02 F																				TRW		TRW	TRW	TRW						
02 G																				TRW		TRW	TRW	TRW						
02 H																				TRW		TRW	TRW	TRW						
02 X																											MIS		MIS	MIS
02 Y				NON	NON	NON									NON													NON		

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A	TBM			INH				UNK	VAR		TBM		TBM	TBM	TBM	TBM			INH	TBM		HAC	HAC	INH	INH	INH	TBM	TBM		INH
02 B	TBM										TBM		INH	INH	INH	INH	INH		TBM	TBM		UNI	UNI	INH	INH	INH	ADR	ADR		
02 C											TBM		INH	INH	INH	INH						INH	INH	INH	INH	INH	TBM	TBM		
02 D											MRT		INH	INH	INH	INH								INH	INH	INH	TBM	TBM		
02 E													INH	INH	INH	INH														
02 X		MIS	N/A			MIS	MIS			MIS		MIS						UNK			NON								MIS	
02 Y					NON																						TBM	TBM		
02 Z											MIH																			

QUESTION 251 IF YOU PURCHASE SOFTWARE AIDS/PACKAGES FROM EXTERNAL DEVELOPERS APPROXIMATELY WHAT PERCENT IS PURCHASED (VERSUS DEVELOPED IN-HOUSE)? ---------- %

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 001	MIS	MIS	MIS	000	MIS	015	020	020	020	010	010	030	030	010	005	MIS	MIS	010	010	002	000	002	002	002	090	030	MIS	070	MIS	000

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 001	005	MIS	MIS	000	000	000	000	001	MIS	000	095	MIS	025	025	025	025	001	020	MIS	100	MIS	050	050	015	015	015	070	070	001	000

QUESTION 252

DOES THE FIRM HAVE A SPECIAL ORGANIZATION OR GROUP THAT AIDS THE PROJECT MANAGER IN SELECTING SOFTWARE DEVELOPMENT AIDS/PACKAGES?
A. YES (TITLE)
B. NO
C. COMMENT:

RESPONDOR / PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A										SQA	SQA	SWS	SWS		DPR	DOT					SQA					DOT				
01 B	YES	YES	YES	YES	YES	YES	YES	YES	YES					YES			YES	YES	YES	YES		YES	YES	YES	YES					YES
01 X																											MIS	N/A	MIS		

RESPONDOR / PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A			PID								EVG									SYS		SWT	SWT	CNG	CNG	CNG	SWT	SWT		ESS
01 B	YES			YES	YES	YES	YES	YES	YES	YES			YES	YES	YES	YES	YES	YES	YES		YES								YES	
01 X		MIS										N/A																		

QUESTION 255

ARE SOFTWARE ATDS PRIMARILY WRITTEN IN ASSEMBLY LANGUAGE AS OPPOSED TO A HIGHER ORDER LANGUAGE SUCH AS COBOL?

A. YES
B. NO (WHAT LANGUAGE) ----------
C. VARIES WIDELY (ADDED)
Y. NONE USED (ADDED)
Z. COMMENTS

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A					YES	YES	YES	YES	YES	YES	YES	YES	YES	YES					YES	YES									YES	
01 B															YES															
01 B1	FOR	FOR	FOR						YES	YES											FOR	FOR	FOR	FOR	FOR	FOR	FOR			
01 B2																					JOV	COR	JOV	JOV	JOV	PL1	PL1			
01 X																			MIS								MIS	MIS		
01 Y					Col																							Col		
01 Z															DIR															

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES		YES	YES							YES		YES	YES	YES	YES					YES	YES	YES	YES	YES	YES	YES			
01 B1		FOR			FOR	FOR	FOR	FOR	FOR	FOR							FOR	FOR	FOR									FOR		
01 B2							PL1	PL1		JOV							PL1											JOV		
01 X		MIS							MIS			MIS							MIS	MIS									Col	
01 Y																														

QUESTION 250

WHICH SOFTWARE DEVELOPMENT AIDS (e.g., COPY LIBRARY) SUPPLIED BY THE HARDWARE MANUFACTURER DO YOU USE TO ASSIST IN APPLICATION SYSTEM DEVELOPMENT?

	NAME(1)	MANUFACTURER(2)
A.	----------	----------
B.	----------	----------
C.	----------	----------
D.	----------	----------
E.	----------	----------
Y.	DON'T USE ANY OF THEM	

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A							FOR	FOR	FOR	UTI	UTI	ALI	COM		INT	INF	ALI			INF	ALI	INF	INF	INF	SSW	CSS				
01 B							LIB	LIB	LIB			ALL	ASS		IMS										DOC	FSC				
01 C							FLT	FLT	FLT			EMU	MIR													ASS				
01 D																										TSO				
01 X				UNK		MIS								MIS													MIS	MIS	MIS	UNK
01 Y	NON	NON	NON		NON													NON	NON											

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	LIB		OPR		COM	VAR	VAR	COM	ALI		LIB		ASS	ASS	ASS	ASS	TXF	RIX	AFI	INF		COM	COM	INF	INF	INF	IMS	IMS		
01 B			UTI		TXF			LIB			UTI		EMU	EMU	EMU	EMU	BUG	OPR	TXF			SSW	SSW	INF	INF	INF	TPN	TPN		
01 C					BUG			UTL			S20		UTI	UTI	UTI	UTI											SSW	SSW		
01 D					ASS			SYG			RET																		UNK	
01 X		MIS																			NON						NON			
01 Y				NON						NON		NON																		
01 Z											SSH																			

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 A							UNI	UNI	UNI	INH	INH	DEC	CDC		CDC		MUL				MUL	INF	MUL	MUL	MUL	IBM	IBM			
02 B							UNI	UNI	UNI			CDC	CDC		IBM										CDC	CDC				
02 C							UNI	UNI	UNI			NAN	CDC												INH					
02 D																									IBM					
02 X				UNK		MIS								MIS		MIS											MIS	MIS	MIS	UNK
02 Y	NUN	NUN	NUN		NUN													NUN	NUN											

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 A	IBM					VAR	VAR	MUL	MUL		IBM		KET	KET	KET	KET	ALL	UPK	INH			UNI	UNI	UNI	UNI	UNI	IBM	IBM	
02 B								MUL			TOP		KET	KET	KET	KET	ALL	IBM	IBM			UNI	UNI	IBM	IBM	IBM	IBM	IBM	
02 C								MUL			MRT		KET	KET	KET	KET											IBM	IBM		
02 D								MUL			MUL																		UNK	
02 X		MIS	MIS		MIS															MIS							NUN			
02 Y				NUN						NUN		NUN									NUN									

QUESTION 245

IN MONITORING SYSTEM DEVELOPMENT, SYSTEM SOFTWARE IS USED TO:
A. COUNT COMPILES PER MODULE
B. COUNT LINES OF CODE PRODUCED
C. CHECK FOR ADHERENCE TO CODING CONVENTIONS
D. CHECK FOR USE OF STANDARD DATA ELEMENT NAMES
E. MEASURE SPARE TIME (ADDED)
F. RESTRICT ACCESS TO SPECIFIC AREAS OF MEMORY (ADDED)
G. KEEP TRACK OF DATA SETS & STORAGE USAGE (ADDED)
H. MONITOR EXECUTION TIME (ADDED)
I. NUMBER OF TIMES PROGRAM MODULES ARE EXECUTED (ADDED)
J. MONITOR QUEUE LENGTH (ADDED)
K. PROVIDE PROPER TIMING INFORMATION (ADDED)
L. PROVIDE PROGRAM RESOURCE UTILIZATION DATA (ADDED)
Y. DO NOT USE SOFTWARE TO MONITOR SYSTEM DEVELOPMENT
Z. OTHER:

RESPONDOP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																YES					YES					YES				
01 B												YES				YES				YES	YES	YES	YES	YES		YES				
01 C												YES	YES			YES				YES		YES	YES	YES		YES				
01 D												YES	YES			YES	YES			YES	YES	YES	YES	YES		YES				
01 G																										COL				
01 H																										COL				
01 I																										COL				
01 J																										COL				
01 K															COL															
01 L															COL															
01 X																									MIS		MIS		MIS	
01 Y	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON				NON			NON	NON								NON		NON	

PARTSUB	RESPONSE 201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A				YES																YES							YES	YES		
01 B				YES									YES	YES	YES	YES				YES							YES	YES		
01 C	YES			YES				YES			YES						YES													
01 D				YES				YES	YES		YES						YES										YES	YES	YES	
01 E			YES																											
01 F								Col																						
01 G											Col																			
01 H																								Col	Col	Col				
01 X		MIS																												
01 Y					NON	NON	NON			NON		NON						NON	NON		NON	NON	NON							NON

QUESTION 256

LIST MANUALLY DERIVED PRODUCTIVITY INDEXES SUCH AS LINES OF CODE PROGRAM ERRORS, TURN AROUNDS REQUIRED PER COMPLETED TASK, ETC., THAT YOU EMPLOY IN MONITORING PERFORMANCE.

A. _____
B. _____
C. _____
D. _____
E. _____
Y. DON'T USE PRODUCTIVITY INDEXES

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				LOC						LOC	LOC	MPT	LOC		TAT	VAR										LOC		LOC		LOC
01 B				TIC						NCH	NCH	VAR	DRP		RES											KHH		NCT		TIC
01 C													CPH		YES											CUR		MPT		
01 D																												NSM		
01 E																												POH		
01 X																											MIS		MIS	
01 Y	PON	NON	NON		NON	NON	NON	NON	NON							NON			NON	NON	NON	NON	NON	NON	NON	NON				

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A				LOC		LOC			MAT		NCT		LOC	LOC	LOC	LOC	LOC			TIC		RWC	RWC	LOC	LOC	LOC			LOC	LOC
01 B				MAT		TOT					NSM																			TIC
01 X			MIS																MIS											
01 Y	PON			NON		NON	NON		NON	NON										NON		NON								
01 Z													OTH																	

QUESTION 237

IF YOU ARE PRESENTLY USING ON-LINE, INTERACTIVE PROGRAMMING, CHECK AND FILL IN THOSE ANSWERS WHICH APPLY.

A. WE ARE PRESENTLY STARTING TO USE ON-LINE INTERACTIVE PROGRAMMING
B. WE HAVE BEEN USING ON-LINE, INTERACTIVE PROGRAMMING SINCE 19---
C. WE PRESENTLY EMPLOY ON-LINE, INTERACTIVE PROGRAMMING ON -----% OF THE PROJECTS FOR WHICH HARDWARE AND SOFTWARE SUPPORT FOR THE CAPABILITY ARE AVAILABLE
Y. DO NOT USE ON-LINE, INTERACTIVE PROGRAMMING
Z. COMMENT:

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				YES																						YES				YES
01 B							066	066	066	070	070	075	074		065	067				068	075	068	068	068	069					
01 C				010			100	100	100			100	100		080			025	025		010								025		010
01 X																											MIS		MIS	
01 Y	NON	NON	NON		NON	NON								NON			NON													

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A								YES														YES	YES						YES	
01 B	065		070		074	072	072			064	072			076	076	076	076		069	075	071	074			068	068	068	070	070		072
01 C	030		015	100	020	100	100			100	040			075	075	075	075		080	010					080	080	080	100	100		020
01 X		MIS																												
01 Y									NON		NON						NON				NON									

QUESTION 238

OUR EXPERIENCE TO DATE INDICATES THAT ON-LINE, INTERACTIVE PROGRAMMING IS:

A. A HIGHLY EFFECTIVE DEVELOPMENT TOOL
B. EFFECTIVE IN SOME CASES
C. OF LIMITED UTILITY
D. A DRAIN ON HARDWARE RESOURCES
F. INEFFICIENT USE OF PERSONNEL (EXPENSIVE) (ADDED)
F. A NICE TOY
Y. NO EXPERIENCE WITH ON-LINE, INTERACTIVE PROGRAMMING
Z. OTHER:

RESPONDOR																											
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A							YES	YES	YES	YES	YES	YES	YES					YES	YES						YES					
01 B	YES	YES	YES	YES											YES	YES				YES	YES	YES	YES	YES		YES		YES		YES
01 X																											MIS		MIS	
01 Y					NON	NON									NON		NON													

RESPONDOR																														
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES			YES						YES	YES		YES	YES	YES	YES		YES			YES			YES	YES	YES	YES	YES		
01 B			YES		YES	YES	YES					YES							YES			YES	YES							YES
01 C																													YES	
01 E																				YES										
01 X		MIS																												
01 Y									NON	NON							NON													

QUESTION 239

IF YOUR EXPERIENCE REFLECTS THAT ON-LINE, INTERACTIVE PROGRAMMING IS AN EFFECTIVE TOOL, IN WHICH SITUATION IS IT MOST EFFECTIVE? (CHECK OR RANK ORDER)

A. DURING DEVELOPMENT OF CODE
B. TO TRY SHORT LENGTH OF CODE FOR POSSIBLE USE (SIMULATION APPROACH)
C. DURING DEBUGGING
D. DURING TESTING
E. DURING ROUTINE RUNS (ADDED)
F. TO DO QUICK AND DIRECT JOBS (ADDED)
G. SCIENTIFIC ANALYSIS (ADDED)
H. AS A SUPPORT TOOL TO UPDATE DATA (ADDED)
I. NOT AN EFFECTIVE TOOL
Y. DO NOT USE ON-LINE, INTERACTIVE PROGRAMMING
Z. OTHER:

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A							004	004	004	YES	YES	001	001					YES	YES						YES					
01 B			YES				002	002	002	YES	YES	002	002																YES	
01 C			YES				001	001	001	YES	YES	002	002		YES					YES	YES	YES	YES	YES	YES			YES		YES
01 D			YES				003	003	003												YES									YES
01 E															YES															
01 F																										YES				
01 G																YES														
01 X																											MIS		MIS	
01 Y	NON	NON	NON			C01	C01										NON			C01										

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	YES			YES	YES	YES	YES			001								YES	YES		001	YES	YES					001	001	YES
01 B	YES			YES						002	001																		YES	YES
01 C	YES			YES						003	002	YES	001	001	001	001		YES			002			YES	YES	YES	002	002		YES	
01 D	YES			YES							003		002	002	002	002								YES	YES	YES	003	003		YES	
01 H			YES																											
01 X		MIS						MIS												MIS										
01 Y									C01								NON													

QUESTION 240

IF YOUR EXPERIENCE REFLECTS THAT ON-LINE, INTERACTIVE PROGRAMMING IS AN EFFECTIVE TOOL, WHAT DO YOU FEEL THE IMPROVEMENT IN PROGRAMMER PRODUCTIVITY OVER CONVENTIONAL (BATCH) SOFTWARE DEVELOPMENT IS?

A. NOT AN IMPROVEMENT
B. SOME IMPROVEMENT (ADDED)
C. 1.5:1 IMPROVEMENT
D. 2:1 IMPROVEMENT
E. 3:1 IMPROVEMENT
F. 5:1 IMPROVEMENT
G. DO NOT KNOW (ADDED)
H. NOT MEASURABLE (ADDED)
Y. DO NOT USE ON-LINE, INTERACTIVE PROGRAMMING
Z. OTHER:

RESPONDOR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																												YES		
01 B																YES														
01 C										C03	C03				C03					C03	YES	C03	C03	C03						
01 D												YES	YES					YES	YES											
01 E					YES	YES	YES																							
01 F																									C02					
01 G			C02																							C02		C02		
01 X																										MIS		MIS		
01 Y	NON	NON	NON		C01	C01								NON			C01													

RESPONDOR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A																						YES	YES							
01 B												C02																		
01 C					YES														YES							YES	YES	YES			
01 D									YES		YES	YES	YES	YES		YES		YES					YES	YES	YES					
01 E	YES			YES							YES																			
01 G			C02																										C02	
01 H						C01	C02																							
01 X		MIS						MIS												MIS										
01 Y									C02								NON													

QUESTION 241

APPROXIMATELY WHAT DOES IT COST YOUR FIRM TO PRODUCE A LINE OF CODE FROM REQUIREMENT SPECIFICATIONS TO SOFTWARE DELIVERY?
A. LOWER RANGE (ADDED) $-------
B. UPPER RANGE (ADDED) $-------

	RESPONDUR																									
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				012			010	010	010	040	040	120	160	025		017				005		005	005	005	010	025				012
01 B				012			010	010	010	040	040	120	160	025		330				150		150	150	150	010	025				012
01 X	MIS	MIS	MIS		MIS	MIS									MIS		MIS	MIS	MIS		MIS						MIS	MIS	MIS	

	RESPONDUR																									
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A			020		030								050	050	050	050	027		055			042	042	015	015	015	030	030	020	006
01 B			030		030								200	200	200	200	027		055			042	042	015	015	015	030	030	020	006
01 X	MIS	MIS		MIS		MIS	MIS	MIS	MIS	MIS	MIS	MIS						MIS		MIS	MIS									

QUESTION 282

APPROXIMATELY WHAT DOES IT COST YOUR FIRM TO MAINTAIN A LINE OF
CODE DURING
A. FIRST YEAR AFTER DELIVERY $--------
B. SECOND YEAR AFTER DELIVERY $--------
C. COMMENT ON TRENDS

	RESPONDOR																									
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A								005	005	005		005		010											.50					
01 B								002	002	002		002																		
01 X	MIS	MIS	MIS	MIS	MIS	MIS					MIS	MIS		MIS		MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS		MIS	MIS	MIS	MIS	MIS

	RESPONDOR																									
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A					010														005				003	003	003					
01 B					005														002				001	001	001					
01 X	MIS	MIS	MIS	MIS		MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS		MIS	MIS	MIS	MIS			MIS	MIS	MIS	MIS	

QUESTION 28

WHICH OF THE FOLLOWING PROCEDURES AND TECHNIQUES HAVE BEEN EMPLOYED IN SOFTWARE DEVELOPMENT ACTIVITIES IN YOUR FIRM? IN PROVIDING ANSWERS ONLY ROUGH APPROXIMATIONS ARE REQUIRED. ALSO INDICATE IF, IN YOUR JUDGEMENT, THE PRACTICE OR PROCEDURE WILL INCREASE OR DECREASE IN THE FORESEEABLE FUTURE?

PROC/TECH	START (1)	DISCON (2)	HIGH (3)	PRES (4)	INC/DEC (5)
A. TEAM CONCEPT (BAKER,1972)	19	19	%	%	
B. DEVEL SUPT LIB (BAKER,1972)	19	19	%	%	
C. HIPO'S (IBM,1975)	19	19	%	%	
D. PSEUDO CODE (YOURDON,1976)	19	19	%	%	
E. WALK THRU'S (WEINBURG,1971)	19	19	%	%	
F. TOP DOWN DES (YOURDON,1976)	19	19	%	%	
G. TOP DOWN IMPL (YOURDON,1976)	19	19	%	%	
H. BOTTOM UP DESIGN (ADDED)	19	19	%	%	
I. BOTTOM UP IMPLEMENT (ADDED)	19	19	%	%	
J. FIRE FIGHTING (ADDED)	19	19	%	%	
K. STRUCTURED PROGRAMMING (ADDED)	19	19	%	%	
Y. DON'T USE					
Z. OTHER					

RESPONDUP

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A				052	070	070	065	065	065	072	072	063	063	076		069					065									052
01 B				076						075	075	070	070	075		064	073			065	065	065	065	065						076
01 C				074						074	074									074	075	074	074	074						074
01 D				076												075				075	065	075	075	075						076
01 I				076	072	072	072	072	072	075	075	063	063			064				073		073	073	073						076
01 F				076			072	072	072	076	076	072	072			064				065	065	065	065	065	069					076
01 G				076			072	072	072	076	076	072	072			064				072	065	072	072	072	069					076
01 H																					065									
01 I																					065									
01 J							055	055	055																					
01 K															074															
01 X	MIS	MIS	MIS															MIS	MIS						MIS	MIS	MIS	MIS		

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A	065				070					073	074		060	060	060	060			068		070	067	067	058	058	058	075	075		052
01 B	068								073	073	074		065	065	065	065						073	073	074	074	074	075	075		
01 C	072									073			076	076	076	076						074	074	074	074	074	075	075	074	075
01 D	067																							075	075	075	075	075		
01 E	070									073			076	076	076	076			076		070	074	074	076	076	076	072	072	076	
01 F	065		070		076					072	075						076		072	100	075	063	063	075	075	075		075	074	077
01 G	065		070		076					072	075						072				076	072	072	075	075	075	075	075	074	077
01 I																			073											
01 X		MIS		MIS		MIS	MIS	MIS				MIS						MIS												

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
02 C										075	075																			
02 X	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS			MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
02 X	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
03 A				100			050	050	050	100	100										080									100
03 B				010						100	100										020									010
03 C				015						025	025										010									015
03 D				010																	010									010
03 E				010			050	050	050	075	075										040									010
03 F				010			040	040	040	050	050										040									010
03 G				010			040	040	040	050	050										040									
03 H																					080									
03 I																					080									
03 J							040	040	040																					
03 X	MIS	MIS	MIS		MIS	MIS						MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS		MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
03 A	050				100						070		100	100	100	100	020					100	100	070	070	070	100	100		100
03 B	060										070		100	100	100	100	010					025	025	005	005	005	100	100		010
03 C	010												010	010	010	010						080	080	005	005	005	100	100		
03 D	035																						010	010	010	025	025			
03 E	070												015	015	015	015						025	025	005	005	005	100	100		
03 F	060				100						075										100	100	100	015	015		100	100		005
03 G	050				100						075											100	100	015	015	015	060	060		005
03 X		MIS	MIS	MIS		MIS	MIS	MIS	MIS	MIS		MIS									MIS	MIS		MIS					MIS	

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
04 A				100	080	060	050	050	050	100	100										080									100
04 B				010						100	100									075	020	075	075	075						010
04 L				015						000	000									002	010	002	002	002						015
04 D				010																040	010	040	040	040						010
04 E				010	060	040	020	020	020	075	075									090	040	090	090	090						010
04 F				010			040	040	040	050	050									095	040	095	095	095						010
04 G				010			040	040	040	050	050									050	040	050	050	050						010
04 H																					060									
04 I																					060									
04 J							020	020	020																					
04 K															010															
04 X	MIS	MIS	MIS									MIS	MIS	MIS		MIS	MIS	MIS	MIS						MIS	MIS	MIS	MIS	MIS	

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
04 A	030										070		100	100	100	100						100	100	070	070	070	100	100		100
04 B	080										070		100	100	100	100						025	025	005	005	005	100	100		
04 L	005												010	010	010	010						070	070	004	005	004	100	100		010
04 D	035																							010	010	010	025	025		
04 E	070												015	015	015	015						015	015	005	005	005	100	100		
04 F	080										075						020			100		100	100	015	015	015	100	100		005
04 G	050										075						020					100	100	015	015	015	050	050		005
04 X		MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS	MIS		MIS						MIS	MIS		MIS								MIS	

RESPONDUR

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
05 A	INC	INC	INC	INC	INC	INC	SIY	SIY	SIY	SIY	SIY	INC									SIY									INC
05 B	INC	INC	INC	INC						SIY	SIY	INC									SIY	INC	INC	INC						INC
05 C				INC						SIY	SIY									DEF	INC	DEE	DEE	DEE						INC
05 D				INC																	DEF									INC
05 E				INC	INC	INC	INC	INC	INC	INC	INC									INC	SIY	INC	INC	INC						INC
05 F	INC	INC	INC	INC			INC	INC	INC	INC	INC	INC								INC	INC	INC	INC	INC	INC					INC
05 G	DEF	DEF	DEF	INC			INC	INC	INC	INC	INC	INC									INC				INC					INC
05 H																					DEF									
05 I																					DEE									
05 J							DEF	DEE	DEF																					
05 K															INC															
05 X													MIS	MIS		MIS	MIS	MIS	MIS							MIS	MIS	MIS	MIS	

RESPONDUR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
05 A	INC									INC	INC		SIY	SIY	SIY	SIY	INC	INC			INC	SIY	SIY	SIY	SIY	SIY				
05 B	INC									INC	INC		SIY	SIY	SIY	SIY	INC					INC	INC	INC	INC	INC				
05 C	DEF									INC			INC	INC	INC	INC						INC	INC	DEE	DEE	DEF			INC	INC
05 D	INC																	INC						UNK	UNK	UNK	INC	INC		
05 E	INC									INC			INC	INC	INC	INC		INC			INC	INC	INC	INC	INC	INC			INC	
05 F	SIY		INC							INC	INC		INC	INC	INC	INC	INC	INC		SIY	INC	SIY	SIY	INC	INC	INC			INC	INC
05 G	INC		INC							INC	INC		INC	INC	INC	INC	INC	INC			INC	SIY	SIY	INC	INC	INC			DEE	INC
05 X		MIS		MIS	MIS	MIS	MIS	MIS	MIS			MIS							MIS											

QUESTION 204

AT WHAT STAGES IN THE DEVELOPMENT CYCLE ARE MANAGEMENT REVIEWS GENERALLY REQUIRED?

A. SYSTEM REQUIREMENTS REVIEW (ADDED)
B. PRELIMINARY DESIGN
C. CRITICAL DESIGN
D. MODULE DESIGN REVIEWS (FUNCTION) (ADDED)
E. FINAL CONFIGURATION
F. PHYSICAL CONFIGURATION AUDIT (ADDED)
G. FINAL TEST (ADDED)
H. COMPLETION OF TEST AND INTEGRATION PLAN (ADDED)
I. COMPLETION OF SYSTEM TEST & USER TEST PHASE (ADDED)
J. DURING EMERGENCY SITUATIONS (ADDED)
K. PRESELECTED MILESTONES (ADDED)
L. SPORADIC MANAGEMENT AUDITS (ADDED)
Y. DO NOT EMPLOY MANAGEMENT REVIEWS
Z. OTHER

RESPONSE

PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A																				C02		C02	C02	C02						
01 B	YES	YES	YES		YES		YES	YES	YES	YES	YES	YES	YES	YES			YES	YES	YES	YES		YES	YES	YES	YES				YES	
01 C	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES			YES	YES	YES	YES	YES	YES	YES	YES				YES		
01 D												C02																		
01 E	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES			YES	YES	YES	YES		YES		YES		YES	YES	YES				YES	
01 J																	C02													
01 K																MIS										MIS		MIS		
01 Y				NON																					NON				NON	

RESPONDR

PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A																									CU2		CU2	CU2	CU2	
01 H	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
01 L	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
01 E	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES		YES	YES	YES	YES	YES			YES		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
01 F		CU2																												
01 G				CU2																										
01 H																											CU2	CU2		
01 J																											CU2	CU2		
01 J									CU2																					
01 K																								CU2		CU2				
01 L																						YES	YES							

QUESTION 245

IS THERE ANY UNIQUE ASPECT TO THE PRINCIPAL FUNCTION OF YOUR FIRM (UNLESS YOU ARE PRIMARILY A SOFTWARE DEVELOPMENT HOUSE) THAT YOU HAVE BEEN ABLE TO ADAPT TO THE SOFTWARE DEVELOPMENT TASK?

A. ----------

B. NO

RESPONDOR																											
PART/SUB	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
01 A						B01	B02				B06	B04				B05				B08		B08	B08							
01 P																							B08							
01 X	MIS	MIS	MIS											MIS										MIS	MIS	MIS				
01 Y				NON			NON	NON	NON	NON					NON	NON		NON	NON	NON	NON		NON				NON	NON		NON

RESPONDOR																											
PART/SUB	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230
01 A								B03					B07	B07	B07	B07														
01 X		MIS		N/A		MIS	MIS				MIS						N/A	MIS												
01 Y	NON		NON		NON				NON	NON		NON							NON	NON	NON	NON	NON	NON	NON	NON	NON	NON	NON

SECTION 3
REFERENCE

INTRODUCTION

In preparing this survey, literally hundreds of books, articles, and papers were read. The results of this literature search became a general model of how software engineering project management was accomplished. This model is represented by the original questionnaire. It would be impractical in an informal report such as this to list all these publications particularly since many of the ideas contributed were general across many different publications. However, where one document was the source of most of one question (or a group of questions) or a unique definition was used (i.e., structural programming, HIPO, Chief Programmer, Orthodox Job Enrichment, etc.) a reference is given. We hope nobody was slighted.

REFERENCES

Armed Services Procurement Regulation (ASPR), Section III, Part 4, "Type of Contracts," Dept of Defense (1976)

Baker, F.T., Chief Programmer Team Management of Production Programming," IBM System Journal, Vol II, Spring, pp 56-73 (1972)

Black, Rachel K.E., BCS Software Production Data, BCS Report F30602-76-C-0174, (Prepared for Air Force Rome Air Development Center), Boeing Computer Services, Inc., Seattle (1977)

IBM, "HIPO" - A Design Aid and Document Technique", IBM Installation Manual, GC20-1851-1, IBM Corp (May 1975)

Yourdon, Edward, How to Manage Structured Programming, Yourdon, Inc., New York (1976)

Weinberg, Gerald, The Psychology of Computer Programming, Van Nostrand Reinhold, New York)1971)

APPENDIX A

CONTRIBUTORS

INTRODUCTION

This appendix lists those individuals (usually project managers) and firms who completed the survey. This list is provided to: (1) acknowledge the contribution, hard work, and willingness to contribute to the general knowledge of computer science by these individuals, and (2) to lend credibility to this report by making visible the excellent source of the data.

These people and companies are all members and supporters of the AIAA Technical Committee on Computer Systems.

At the end of this list is a group of individuals that wished to remain anonymous in order that they could provide more candid, truthful answers.

It was obvious from the answers received that the contributors worked very hard making the answers as truthful as possible. Again, the authors thank you.

CONTRIBUTORS

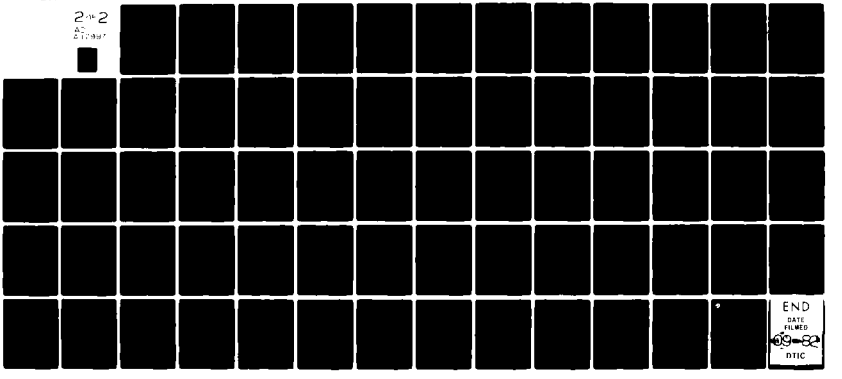
Mr. Philip S. Babel Technical Advisor for Computer Systems Acquisition	Simulator Systems Program Office Aeronautical Systems Division Wright-Patterson AFB, OH 45433
Mr. Francis J. Barrett Chief, PEACE SIGMA Development Unit	Data Automation Branch Sacramento Air Logistics Center McClellan AFB, CA 95652
Mr. Frank L. Bernstein Vice President Federal Systems Division	CALCULON Corporation 1501 Wilson Boulevard Arlington, VA 22209
Mr. Herman S. Binder Section Head, Systems Design Analysis & Integration Section	Grumman Aerospace Corporation Bethpage, NY 11714

Mr. M. Lenard Birns Program Manager, Naval Warfare Gaming System	Defense Systems Division Computer Sciences Corporation 304 West Route 38, Box N Moorestown, NJ 08057
Mr. Jack E. Bloodworth Manager, ALCM Software	The Boeing Aerospace Company P. O. Box 3999 Seattle, WA 98124
Mr. David A. Brown Chief, ARRCS Development Group	Data Automation Branch Sacramento Air Logistics Center McClellan AFB, CA 95652
Mr. Allen G. Burgess Manager, Computer Systems Laboratory	Equipment Division Raytheon Company 528 Boston Post Road Sudbury, MA 01776
Mr. George R. Cannon, Jr. Manager of Vandenberg Programs	Logicon, Incorporated P. O. Box 1567 Vandenberg, CA 93437
Mr. Frank J. Cerulli Director of Engineering Computer Systems Division also Products Systems Division	Lockheed Electronics Company, Incorporated U.S. Highway 22 Plainfield, NJ 07061
Mr. James P. Chilton Director, Data Processing Sub Systems Systems Technology Program	McDonnel Douglas Astronautics Company 5301 Bolsa Avenue Huntington Beach, CA 92647
Mr. Arthur C. Ciccolo Associate Division Leader Computer Science Division	The Charles Stark Draper Laboratories, Incorporated 555 Technology Square Cambridge, MA 02139
Mr. James W. Clark Manager of Engineering Operations	United Technologies Research Center East Hartford, CT 06108
Mr. Jerry E. Cummings Program Analyst Logistics Research & Systems Division	Directorate of Plans & Programs Sacramento Air Logistics Center McClellan AFB, CA 95652

Mr. G. Russell Curtis Manager, Simulation & Data Systems Information Systems Programs	General Electric Company 450 Persian Drive Sunnyvale, CA 94086
Mr. Alan J. Deerfield Consulting Scientist	Submarine Signal Division Raytheon Company P. O. Box 360 Portsmouth, RI 02871
Mr. Edward M. Dunaye Director, Quality Assurance	Planning Research Corporation 7600 Old Springhouse Road McLean, VA 22101
Mr. Joe N. Dyer Manager, Equipment Evaluation & Systems Programming	Lockheed Missile & Space Company, Incorporated P. O. Box 504 Sunnyvale, CA 94088
Mr. Richard R. Erkeneff Chief Design Engineer, Data Control & Processing Systems	McDonnell Douglas Astronautics Company 5301 Bolsa Avenue Huntington Beach, CA 92647
Mr. S. G. Evetts Project Manager	Vought Corporation P. O. Box 5907 Dallas, TX 75222
Dr. George R. Fath Acting Manager Avionics Development Engineering	General Electric Company 901 Broad Street Utica, NY 13503
Mr. Herb Finnie Manager, PLSS Software Development	Lockheed Missile & Space Company, Incorporated P. O. Box 504 Sunnyvale, CA 94088
Mr. J. I. Freeman Avionics Project Engineering	Vought Corporation P. O. Box 5907 Dallas, TX 75222
Dr. Virgil "Smokey" V. Griffith Chief, Electronics Engineer Digital Computer & Software Engineering	McDonnell Aircraft Company P. O. Box 416 St. Louis, MO 63166

Mr. Harvey I. Gold Manager, Software Technology Department	System Development Corporation 2400 Colorado Santa Monica, CA 90406
Dr. Kenneth A. Hales Manager, MSP Mission Control & Software	The Boeing Aerospace Company P. O. Box 3999 Seattle, WA 98124
Mr. Uwe W. Ibs Design Specialist	Pomona Division General Dynamics Corporation P. O. Box 2507 Pomona, CA 91766
Dr. Peter R. Kurzhals Director, Guidance, Control & Information Systems Division	Headquarters National Aeronautics & Space Administration Washington, DC 20546
Mr. John C. Lemanczyk Manager, Software Technology Development	Grumman Aerospace Corporation Bethpage, NY 11714
Mr. Myron Lipow Senior Staff Engineer, Product Assurance Systems Engineering & Integration Division	Defense & Space Systems Group of TRW, Incorporated One Space Park Redondo Beach, CA 90278
Mr. Austin Maher Manager, Software	Kearfoot Division The Singer Company Little Falls, NJ 07424
Dr. John H. Manley Assistant to the Director	Applied Physics Laboratory The Johns Hopkins University Johns Hopkins Road Laurel, MD 20810
Dr. Robert R. McCready Applied Mathematician	Vought Corporation P. O. Box 5907 Dallas, TX 75222
Mr. H. Lewis Parker Manager, Mini/Micro Based Systems Department	COMSTAT Laboratories 22300 Comstat Drive Clarksburg, MD 20734
Dr. Leon Pressor President	Softool Corporation 340 S. Kellogg Avenue Goleta, CA 93017

AD-A117 997 SACRAMENTO AIR LOGISTICS CENTER MCCLELLAN AFB CA SERV--ETC F/G 22/2
RESULTS OF A SURVEY SOFTWARE DEVELOPMENT PROJECT MANAGEMENT IN --ETC(U)
DEC 79 J H LEHMAN, R H THAYER
UNCLASSIFIED SM-ALC/MME-TR-79-54-VOL-1 NL



Dr. Terry A. Straeter Head, Programming Technologies Branch	Langley Research Center National Aeronautics & Space Administration Hampton, VA 23665
Mr. Herbert D. Strong, Jr. Manager, ADP Management Office Flight Projects Support Office	Jet Propulsion Laboratory California Institute of Technology 4800 Oak Grove Drive Pasadena, CA 91103
Mr. R. L. Van Tilburg Senior Scientist Computer Programming Laboratory	Hughes Aircraft Company P. O. Box 3360 Fullerton, CA 92634
Mr. Gene F. Walters Manager, Software Technologies Information Systems Program	General Electric Company 450 Persian Drive Sunnyvale, CA 94086
Mr. Lynn S. Wilson Director, West Coast Operations	Grumman Data Systems Corporation 16133 Ventura Blvd., Sutie 675 Encino, CA 91436
Mr. Eric W. Wolf Manager, Washington Operations	Bolt Beranek & Newman, Incorporated 1701 No. Fort Myer Drive Arlington, VA 22209
Anonymous Techniccal Advisor for Computers	Engineering & Development Organization Large Government Agency (Military)
Anonymous Manager, Communication Analysis	Electronic Systems Large Manufacturing Company
Anonymous Chief, Scientific Applications Analysis Branch	Research Center Large Government Agency (Non-Military)
Anonymous Tech Director, Simulation Division	Software and Engineering Large Manufacturing Company
Anonymous Senior Engineering Specialist Avionics Software	Aircraft Development Large Aerospace Corporation

APPENDIX B
QUESTIONNAIRE

INTRODUCTION

This appendix contains Part One of the questionnaire. Other reports will contain the balance of the questionnaire.

The questionnaire as printed in this report is a modified version of the questionnaire as originally answered. This was done for the following reasons:

(1) Not all questions had accompanying multiple choice answers but were narrative in nature.

(2) The original questionnaire contains space for project managers to add their own comments as answers to the questions rather than select one of the pre-given answers, and

(3) There were errors in the original survey which needed correcting.

The procedures used to report on those questions that did not have preselected answers was to modify the original questionnaire to make it "look like" the authors had preselected these possible answers and the participants had checked them. In truth, the answer set was derived from the submitted answers. To indicate which questions were originally narrative in form, a notation in parenthesis following the question will indicate "originally narrative."

In addition, the original questionnaire contained space for project managers to add their own comments as answers to the questions rather than select one of the pre-given answers. This was encouraged by the author in order to insure that the answers to the questionnaire were as accurate as possible and not distorted by forcing the participant to only select from pre-conceived answers. Again, to provide structure so the answers can be encoded in a computer data base system, the "comment" answers were grouped and the possible "answer set" expanded to include these answers. To indicate these additional answers the word "added" will be placed in parenthesis at the end of the question.

In contrast, Question 45 was left in narrative form. This question was answered by encoding the answers and entering this code on the tabulation sheets.

Other modifications were made to the original questionnaire where the participants indicated the question was poorly worded or where the participants modified the original question by the insertion of a word or phrase. The author inserted these in the interest of making this version of the questionnaire more complete. These additions to the original questions and/or original answers are indicated by placing the added portion in brackets "[ ]" and placing the word "added" in parenthesis at the end of the question or answer.

The author hopes that the above explanations do not appear to be too complex. It was done purely in the interest of conveying the maximum amount of information to the reader about the original questions and the possible answers presented to the respondent.

References were added where they were needed or where the addition of a reference would make the question clearer. An abbreviated source is contained in brackets "[ ]" and the complete source follows this appendix.

RULES AND CONDITIONS FOR PARTICIPATING IN SURVEY

It is important that no company, or individual suffer any loss of proprietary information or receive unfavorable publicity as a result of this survey. Each individual participating in the survey has our full assurance that the data he provides will be treated in accordance with the above principles. In order to achieve this we stipulate the following:

1. Unless specifically authorized, the names of participating firms, or individuals will not be listed in the report as contributors.

2. The anonymity of the company, department, individual, and project will be preserved in every instance.

3. Any proprietary or company confidential information, if so identified (by writing "CONF" beside the question) will be protected and used only in deriving statistical data.

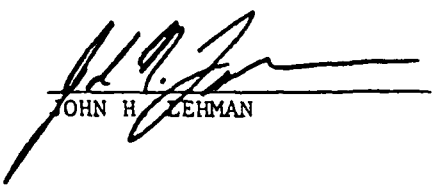
4. The individual completing the questionnaire can omit the answer to any question without invalidating the questionnaire.

5. Only if cleared for further dissemination will raw data (completed forms) be made available to the participating AIAA TC members, should such request be made, to assist them in research work of their own. Without exception, all company, department, project, and individual names, as well as responses identified as "CONF" will be systematically deleted prior to release.

6. If so requested by the submitter, only statistical data will be derived from the survey, and the survey form destroyed upon publication of the final report.

Though it is seen as providing benefits to all participants, including the U.S. Air Force, this survey is not sponsored by the U.S. Air Force, or any individual, group, committee, or company, and does not imply any obligation on the part of the participants. It is being accomplished solely to provide data to be presented at the AIAA Conference, Computers in Aerospace, 31 Oct - 2 Nov 1977, Los Angeles, California.

RICHARD H. THAYER



JOHN H. LEHMAN

MEMO OF UNDERSTANDING

I make the following stipulations under which this survey can be used: (Please sign each stipulation you wish to make as precondition to submitting this survey. Line through those paragraphs which do not apply.)

This survey with company, department, project and other identifying markings, and with all answers marked "CONF" deleted can be duplicated and provided to the TC members at their request.

_____ Signature of Submitter

This survey can only be used to provide statistical data and cannot be released to the TC members for their use in any but a composite statistical or summary form. Following publication of final report both this form and the survey must be destroyed by shredding, pulping, or similar means.

_____ Signature of Submitter

I authorize the release of the firm name in a list of participants to be included as an addendum to the final report. The desired name, title, etc., is:

_____

_____

_____

_____ Signature of Submitter

A SURVEY OF MANAGEMENT TECHNIQUES AND PROCEDURES EMPLOYED IN SOFTWARE DEVELOPMENT PROJECTS

INSTRUCTIONS

Each survey packet comprises three parts. The number of packets provided will, in most cases, match the number of projects to be reported on plus one spare. If more forms are required you may copy or call.

PART ONE of the survey deals with defining the total organization and the overall management structure, requirements, and philosophy, and is intended to be answered by top management. It provides the backdrop against which the individual projects are to be viewed. Normally, only one copy of PART ONE should be completed per mailing, but each packet contains PARTS ONE, TWO, and THREE for the sake of uniformity and the chance that, in some instances, additional PART ONES would be called for.

A PART TWO is to be completed for each project reported on, and is intended to be completed by the project manager. (It is assumed the project is completed or almost completed) If these methods now often referred to as Modern Programmer Productivity Techniques (top down design, structured programming, et al.) are being used in whole, or in part, in your development activities, you should consider selecting a representative sample of before and after projects in completing the survey.

PART THREE consists of general questions not related to any specific project, and is also intended to be completed by a project manager. One PART THREE is included in each packet on the assumption that each project will be reported on by a different project manager. If one manager reports on more than one project, he or she would only complete PART THREE one time.

The dynamic nature and infinite diversity of the entire field of Data Processing has kept the jargon from becoming universally defined. For this reason we have attempted to avoid terms that might have more than one meaning. If questions appear vague or imprecise, feel free to call for clarification. Or, if you prefer, rewrite the question to ask what you believe the point to have been, or to relate it to your particular environment.

The answers provided for each question are not the universal set of possible responses, so, if you believe selecting one of the canned replies would be misleading please select "other" or "comment" and explain. If more space is required, write in the margins indicating the number of the question being answered. If a question defies

answering either through complexity, non-relevance to your environment, or excessive research feel free to leave it blank or enter an appropriate comment. If you write "CONF" in the left margin adjacent to any question, that response will be treated as confidential/proprietary data as described under "Rules and Conditions..", attachment 1 to the basic letter.

If possible, avoid direct reference to specific firms, projects, and people. Each set of questionnaires has been numbered in order that we might keep related responses together and facilitate accounting. Base numbers have been selected at random and no algorithym has been employed that would facilitate pairing firms with forms.

We very much appreciate the time and effort you're putting into this. Your time, effort, and candor are essential to the success of our joint effort.

Please return the completed surveys in the return envelope provided or mail to:

Colonel Richard H. Thayer
SM-ALC/ACD
McClellan AFB, CA 95652

A SURVEY OF MANAGEMENT TECHNIQUES AND PROCEDURES

EMPLOYED IN SOFTWARE DEVELOPMENT PROJECTS

PART ONE (Modified)

INTRODUCTION. PART ONE of the survey pertains to the company or firm as a whole (a major division of a very large corporation, e.g., IBM - Federal Systems Division, General Dynamics - Fort Worth, Grumman Data Systems Corporation, NASA Langley Research Center is considered to be an independent company/firm for the purpose of this survey). PART ONE deals with defining the total organization and the overall management structure, requirements, and philosophy and is intended to be answered by a senior ADP or other senior manager in the company.

THE IDENTIFICATION NUMBER ASSIGNED TO THIS PACKET IS _____.

Please return the completed Questionnaire in the envelope provided or mail to:

Colonel Richard H. Thayer
SM-ALC/ACD
McClellan AFB, CA 95652

1. What position do you hold in the company? (Originally narrative)

   a. Senior Corporate Officer (President, Vice President, Executive Officer, etc) [ ]

   b. Senior ADP Officer [ ]

   c. Senior Functional Area (Non ADP) Manager (i.e., Director of Engineering, Manager Airframe Development, Chief of Production, Program Manager) [ ]

   d. Project Manager Software Development [ ]

   e. Technical Director, Quality Assurance, IV&V Supervisor, etc [ ]

   f. Senior Corporate Staff [ ]

   g. Project Individual [ ]

   y. None of the above [ ]

   z. Other/Comment if necessary _____ [ ]

   _____

   _____

2. What is the title/position of the senior ADP officer in the firm? (e.g., Vice President in Charge of Data Services) (Originally narrative)

a. Corporate Officer (President, Vice President, Executive Officer, etc.) [ ]

b. Chief (Vice President, Director, Managing Head) Data Processing (Computing, Information Systems, Data Services, Data Automation, etc.) [ ]

c. Assistant Controller (Financial Manager, etc.) [ ]

d. Software Analysis (Engineer, Developer, etc.) [ ]

y. Not applicable to organizational structure [ ]

z. Give Title/Comment if necessary _____ [ ]

_____

3. What is the title/position of the individual to whom the senior ADP officer reports? (e.g., President, Comptroller) (Originally narrative)

a. Corporate Officer (President, Vice President, Executive Officer, etc.) [ ]

b. Comptroller (Vice President for Finance, etc.) [ ]

c. Senior Functional Area (non ADP) Manager (Director/Chief of Engineering, Research, Operations, etc.) [ ]

d. Functional Area Supervisors [ ]

y. Not applicable to organizational structure [ ]

z. Other/Comment if necessary _____ [ ]

_____

4. What are the titles/positions of the individuals reporting directly to the senior ADP officer? (e.g., Chief, Software Development Division)

a. _____ [ ]

b. _____ [ ]

c. _____ [ ]

d. _____ [ ]

e. _____ [ ]

f. _____ [ ]

y. None/Not applicable to organizational structure (added) [ ]

z. Comment if necessary _____ [ ]

_____

5. What is a typical line of authority from senior ADP officer [or senior corporate officer over project] through Software Development Project Manager? (added)

a. Senior ADP officer (or _____) to [ ]

b. _____ to c. _____ to [ ]

d. _____ to e. _____ to [ ]

f. _____ to g. _____ to

h. Software Development Project Manager [ ]

y. Not applicable to organizational structure [ ]

z. Comment if necessary _____ [ ]

_____

6. Software Development Project Managers are normally:

a. Functionally oriented (accountant for accounting application, logistician for logistics application, [engineering, etc.] (added) [ ]

b. ADP management oriented [ ]

c. Senior software analysts [ ]

d. Senior software analysts/programmers [ ]

e. Professional Project Managers (generalist) (added) [ ]

y. None of the above (added) [ ]

z. Other: _____ [ ]

7. The firm is primarily: [Taken partly from Computer Survey Subscription Form, 1 June 1977]

a. A manufacturer of computer hardware [ ]

b. A manufacturer of other than computer hardware [ ]

c. A "software house" [ ]

d. An engineering service and technical support organization [ ]

e. The Government: federal (non-military), federal (military), state, county, municipal [ ]

f. A university or educational institution [ ]

g. A computer service bureau, time-sharing service [ ]

h. An ADP consultant and/or education service [ ]

i. Financial: banking, insurance, real estate, securities, credit [ ]

j. In the wholesale or retail trade [ ]

k. In medical or legal services [ ]

l. In transportation services [ ]

m. Utilities: communications, electric, gas [ ]

z. Other/Comment: _____ [ ]

_____

8. The firm is:

a. Operated for a profit [ ]

b. Non-profit organization [ ]

c. Government agency [ ]

y. None of the above [ ]

z. Other: _____ [ ]

9. The firm has ____ principal locations. (e.g., Factory in Peoria, mine and smelter in Ashtabula, Home office in Newark: = 3 locations)

10. Software system development is carried on at ___ of these locations.

11. Gross revenues (Budget for Government Agencies) for last year reported (197_) were: (added)

a. Less than 200 thousand dollars [ ]

b. Between 200 thousand and 1 million dollars [ ]

c. Between 1 million and 10 million dollars [ ]

d. Between 10 million and 50 million dollars [ ]

e. Between 50 million and 100 million dollars [ ]

f. Between 100 million and 500 million dollars [ ]

g. Between 500 million and 1 billion dollars [ ]

h. In excess of one billion dollars [ ]

z. Other: _____ [ ]

12. What percent of [Total] revenue is derived from software development? [For software developed for profit] (added)

a. Less than 10% [ ]

b. Between 10% and 25% [ ]

c. Between 25% and 50% [ ]

d. Between 50% and 75% [ ]

e. Over 75% [ ]

f. All revenue derived from software development [ ]

y. [Not Applicable]/All development done for in-house customers (added) [ ]

z. Other: _____ [ ]

13. What percent of the [total profits] annual budget is devoted to software development activities? [For software not developed for profit/government agencies] (added)

a. Less than 10% [ ]

b. Between 10% and 25% [ ]

c. Between 25% and 50% [ ]

d. Between 50% and 75% [ ]

e. Over 75% [ ]

y. Not applicable (added) [ ]

z. Comment: _____ [ ]

_____

14. How many people:

a. Are employed by the firm _____

b. Work in all aspects of ADP _____

c. Are devoted to Software Development activities _____

z. Comments: _____ [ ]

_____

15. Who exercises approval authority for major software developed for in-house use?

a. Corporate Officer (President, Vice President, etc.) (added) [ ]

b. Senior Functional Area Manager (added) [ ]

c. Comptroller [ ]

d. Director of data processing [Senior ADP official] (added) [ ]

e. Executive one step above functional area involved [ ]

f. Selection Committee (added) [ ]

g. Project Manager (added) [ ]

h. Executive requesting system through some form of internal budget scheme [Requirement Document] (added) [ ]

y. Software not developed for in-house use (added) [ ]

z. Other: _____ [ ]

_____

16. In this question we wish to ascertain which forms of contract you employ and which you prefer in each of three situations. In responding you may either check the answer or provide a rank ordering of those answers that apply. The first situation related to your being the contractor providing software development for a user or customer. The second situation reverses this and places you in the user or customer role. The final situation concerns the form of agreement that is employed when software is developed for in-housers. [ASPR, 1976]

	A	B	C	D	E	F
	You are Contractor		You Contract For		Develop for In-House Use	
Contract Type	Use	Prefer	Use	Prefer	Use	Prefer
a. Firm fixed price	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
b. Fixed price with economic price adjustment	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
c. Fixed price incentive	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
d. Firm fixed price level of effort	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
e. Cost	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
f. Cost sharing	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
g. Cost plus incentive fee	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
h. Cost plus award fee	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
i. Cost plus fixed fee	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
j. Time and materials	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
k. Labor-hour	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
l. Basic ordering agreement	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
y. None (added)	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
z. Other: _____	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

17. Do you use two phase contracts in which: phase one analyzes the requirements, determines feasibility, and estimates costs, and phase two directs development?

	A	B	C
	You are Contractor	You Contract For	Develop for In-House Use
a. Always use them	[ ]	[ ]	[ ]
b. Prefer them on projects of any size	[ ]	[ ]	[ ]
c. Encourage their use on major projects	[ ]	[ ]	[ ]

d. Sometimes use them (added)	[ ]	[ ]	[ ]
e. Hardly ever use them (added)	[ ]	[ ]	[ ]
f. Discourage their use in all but extreme cases	[ ]	[ ]	[ ]
y. Never use them	[ ]	[ ]	[ ]

z. Comment: _____

18. If an incentive clause is included in the contract, what is the incentive normally based on?

	A You are Contractor	B You Contract For	C Develop for In-House Use
a. Reduced cost	[ ]	[ ]	[ ]
b. Early delivery	[ ]	[ ]	[ ]
c. Increased performance	[ ]	[ ]	[ ]
d. Quality factors	[ ]	[ ]	[ ]
y. Not used (added)	[ ]	[ ]	[ ]
z. Other: _____	[ ]	[ ]	[ ]

_____

19. Are bonuses or incentives paid for early/on time completion of software development projects?

a. Yes, for key personnel	[ ]
b. Yes, for other than management positions	[ ]
c. Yes, for all individuals engaged full time on the project	[ ]
d. Yes, to project manager on fixed price contracts (added)	[ ]
e. Yes, based on individual performance (added)	[ ]
f. Yes, management incentive program (added)	[ ]
g. Yes, higher award fee on contract (added)	[ ]
y. No (bonuses or incentive paid) (added)	[ ]
z. Other: _____	[ ]

_____

20. Have procedures been employed in which programmers or analysts bid on specific tasks in the development of projects? e.g., "I'll write the edit program for $1,217.12."

a. Yes	[ ]
b. No	[ ]
z. Comment: _____	[ ]

_____

21. If bidding as described above was employed, how successful has it proven to be?

a. Very [ ]

b. Moderate [ ]

c. Unsuccessful [ ]

y. Not employed [ ]

z. Useful only under the following condition(s) _____ [ ]

_____

22. In most instances:

a. Software development projects are handled within the ADP environment with functional analysts or prospective users being assigned or attached to the development team. [ ]

b. ADP specialists are detailed or assigned to the functional user for the duration of the development effort. [ ]

y. None of the above (added). [ ]

z. Other: _____ [ ]

_____

23. Teams are typically made up of:

a. Permanent employees ___%

b. Temporary hires employed for duration of project ___%

c. Consultants hired at daily/weekly/monthly rate ___%

z. Other: _____

_____

24. If possible, outline the composition of a typical large development team as it would be employed in your firm. To place the team in context a hypothetical project description may be included (e.g., Development of an on-line air cargo manifesting capability).

Hypothetical project description (optional):

_____

Fractions may be used to indicate that the position is not considered a full time job. The following is an example of the notation to be used if one individual occupies more than one position.

f. Administrator _____ _____ 1/3 (g)

g. Librarian DESIGN \SSISTANT 2/3 (f)

The letter in parenthesis is intended to tie the same individual to positions f and g.

Position Title	A Title Used by Your Firm	B Number
a. Project Manager		
b. Asst. Proj. Mgr.		
c. Senior Analyst		
d. Team Chief		
e. Asst. Team Chief		
f. Administrator		
g. Librarian		
h. Application Anal.		
i. Functional Anal.		
j. Applications Prog.		
k. Oper. Sys. Prog.		
l. Tester		
m. Integrator		
n. Data Base Designer (added)		
o. Data Base Administrator (added)		
p. Transition to Production Interface (added)		
q. Quality Assurance (added)		
r. Staff Assistant to Assistant Proj. Manager (added)		
s. Documentation Aids (added)		
t. Hardware Engineers (added)		
y. None of the above (added)		
z. Other:		

25. What is the normal/typical progression to the position of Project Manager, e.g., programmer, analyst, lead programmer, project manager? [(Indicate by putting number opposite position used in order of progression starting with "1" on lowest position and ending with Project Manager)] (added) (Originally narrative)

a. Associate Programmer [ ]
b. Junior Programmer/Analyst [ ]
c. Junior Analyst [ ]
d. Work Unit Leader [ ]
e. Assistant Engineer [ ]
f. Software Engineer [ ]
g. Associate Engineer [ ]
h. Programmer [ ]
i. Associate Programmer/Analyst [ ]
j. Senior Programmer [ ]
k. Systems Analyst [ ]
l. Programmer/Analyst [ ]
m. Lead Analyst [ ]
n. Lead Engineer [ ]
o. Chief Avionics Engineer [ ]
p. Lead Programmer [ ]
q. Staff Programmer/Analyst [ ]
r. Head Programmer [ ]
s. Senior Programmer/Analyst [ ]
t. Task/Work Package Manager [ ]
u. Engineer [ ]
v. Team Chief [ ]
w. Senior Systems Analyst [ ]
aa. Data Systems Specialist [ ]
bb. Supervisor [ ]
cc. Department Head [ ]
dd. Chief Engineer [ ]
ee. Senior Engineer [ ]
ff. Software Systems Engineer [ ]
gg. Software Development Manager [ ]
hh. Deputy/Associate Project Manager [ ]
ii. Scientific Programming Specialist [ ]
jj. Group Leader/Software Development [ ]
kk. Advisory Analyst [ ]

ll. Project Leader [ ]

mm. Project Engineer [ ]

nn. First Line Supervisor [ ]

oo. Second Line Manager [ ]

pp. Engineering Manager [ ]

qq. Project Manager [ ]

y. No pattern [ ]

z. Other: _____ [ ]

_____

26. Are applications analysts also computer programmers?

a. Always [ ]

b. More than half of our analysts are also programmers [ ]

c. Less than half of our analysts are also programmers [ ]

d. Very rarely is an analyst also a programmer [ ]

e. Varies depending on type of work (added) [ ]

z. Comment: _____ [ ]

_____

27. What is your approximate ratio between straight programmers and analysts (programmer/analysts)? [Fill in number opposite a or b *title to indicate ratio*] (added) (Originally narrative)

a. Programmers [ ]

b. Analysts/Programmer Analysts [ ]

c. Varies, depending on situation [ ]

y. None/very few straight programmers or analysts [ ]

z. Comment: _____ [ ]

28. Which manual reporting procedures are used in project monitoring and management? At what level do they originate, and how high do they go? How often are they aggregated, condensed, or edited as they move through the chain?

	REPORT TITLE	A LOWEST ORIGINATOR	B HIGHEST RECIPIENT	C NO. OF AGGS/EDTS
a.	Weekly Activity	_____	_____	_____
b.	Project Status	_____	_____	_____
c.	Significant Change	_____	_____	_____
d.	Cost vs Performance (added)	_____	_____	_____

e. _____ _____ _____ _____

f. _____ _____ _____ _____

y. No manual reporting system used/unknown [ ] [ ] [ ]

z. Comment: _____ [ ]

29. Which automated reporting systems are used in project monitoring and management?

		A LOWEST ORIGINATOR	B HIGHEST RECIPIENT
a.	Manhour by Activity (e.g., code, flow diagram, etc.)	_____	_____
b.	Manday by Task (e.g., prepare users guide, design data base etc.)	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____
y.	No automated reporting systems used	[ ]	[ ]

z. Comment: _____

30. Which commercial, or what locally developed software is employed to assist in the development task? (e.g., LIBRARIAN, Applied Data Research) (If system is of local origin give very brief description, e.g., structured pre-compilers, automatic flowcharters, etc.)

	A NAME	B Vendor, or if locally developed, give brief description.
a.	_____	_____
b.	_____	_____
c.	_____	_____
d.	_____	_____
e.	_____	_____
f.	_____	_____
g.	_____	_____
h.	_____	_____
i.	_____	_____

y. No commercial or locally developed software employed to assist in development tasks. [ ]

31. If you purchase software aids/packages from external developers approximately what percent is purchased (versus developed in-house)? _____ %

32. Does the firm have a special organization or group that aids the project manager in selecting software development aids/packages?

a. Yes (Title:_____) [ ]

b. No [ ]

z. Comment: _____ [ ]

33. Are software aids primarily written in assembly language as opposed to a higher order language such as COBOL?

a. Yes [ ]

b. No (what language): _____ [ ]

c. Varies widely (added) [ ]

y. None used (added) [ ]

z. Comment: _____ [ ]

34. Which software development aids (e.g., copy library) supplied by the hardware manufacturer do you use to assist in application system development?

	A NAME	B Manufacturer
a.	_____	_____
b.	_____	_____
c.	_____	_____
d.	_____	_____
e.	_____	_____

y. Don't use any of them [ ]

35. In monitoring system development, system software is used to:

a. Count compiles per modules [ ]

b. Count lines of code produced [ ]

c. Check for adherence to coding conventions [ ]

d. Check for use of standard data element names [ ]

e. Measure spare time (added) [ ]

f. Restrict access to specific areas of memory (added) [ ]

g. Keep track of data sets and storage usage (added) [ ]

h. Monitor execution time (added) [ ]

i. Number of times program modules are executed (added) [ ]

j. Monitor Queue (length) (added) [ ]

k. Provide proper timing information (added) [ ]

l. Provide program resource utilization data (added) [ ]

y. Do not use software to monitor system development [ ]

z. Other: _____ [ ]

36. List manually derived productivity indexes such as lines of code, program errors, turn arounds required per completed task, etc., that you employ in monitoring performance.

a. _____

b. _____

c. _____

d. _____

e. _____

y. Don't use productivity indexes [ ]

37. If you are presently using on-line, interactive programming, check and fill in those answers which apply.

a. We are presently starting to use on-line interactive programming. [ ]

b. We have been using on-line, interactive programming since 19___. [ ]

c. We presently employ on-line, interactive programming on ____% of the projects for which hardware and software support for the capability are available. [ ]

y. Do not use on-line, interactive programming [ ]

z. Comment: _____ [ ]

_____

38. Our experience to date indicates that on-line, interactive programming is:

a. A highly effective development tool [ ]

b. Effective is some cases [ ]

c. Of limited utility [ ]

d. A drain on hardware resources [ ]

e. Inefficient use of personnel (expensive) (added) [ ]

f. A nice toy [ ]

y. No experience with on-line, interactive programming [ ]

z. Other: _____ [ ]

_____

39. If your experience reflects that on-line, interactive programming is an effective tool, in which situation is it most effective? (Check or rank order)

a. During development of code [ ]

b. To try short length of code for possible use (simulation approach) [ ]

c. During debugging [ ]

d. During testing [ ]

e. During routine runs (added) [ ]

f. To do quick and dirty jobs (added) [ ]

g. Scientific analysis (added) [ ]

h. As a support tool to update data (added) [ ]

i. Not an effective tool [ ]

y. Do not use on-line, interactive programming [ ]

z. Other: _____ [ ]

_____

40. If your experience reflects that on-line, interactive programming is an effective tool, what do you feel the improvement in programmer productivity over conventional (batch) software development is?

a. Not an improvement [ ]

b. Some improvement [ ]

c. 1.5:1 improvement [ ]

d. 2:1 improvement [ ]

e. 3:1 improvement [ ]

f. 5:1 improvement [ ]

g. Very great improvement (not measured) (added) [ ]

h. Do not know (added) [ ]

i. Not measurable (added) [ ]

y. Do not use on-line, interactive programming [ ]

z. Other: _____ [ ]

_____

41. Approximately what does it cost your firm to product a line of code from requirement specifications to software delivery?

a. lower range (added) $___

b. upper range (added) $___

42. Approximately what does it cost your firm to maintain a line of code during

a. First year after delivery $____

b. Second year after delivery $____

z. Comment on trend: _____

_____

43. Which of the following procedures and techniques have been employed in software development activities in your firm? In providing answers only rough approximations are required. Also indicate if, in your judgement, the practice or procedure will increase or decrease in the foreseeable future?

Proc/Tech		A Start	B Discon	C High	D Pres	E Inc/Dec
a.	Team Concept [Baker, 1972]	19__	19__	__%	__%	_____
b.	Devel Supt Lib [Baker, 1972]	19__	19__	__%	__%	_____
c.	HIPO's [IBM, 1975]	19__	19__	__%	__%	_____
d.	Pseudo Code [Youndon, 1976]	19__	19__	__%	__%	_____
e.	Walk thru's [Weinburg, 1971]	19__	19__	__%	__%	_____
f.	Top Down Des. [Youndon, 1976]	19__	19__	__%	__%	_____
g.	Top Down Impl [Youndon, 1976]	19__	19__	__%	__%	_____
h.	Bottom up Design (added)	19__	19__	__%	__%	_____
i.	Bottom up Implementation (added)	19__	19__	__%	__%	_____
j.	Fire Fighting (added)	19__	19__	__%	__%	_____
k.	Structured Programming (added)	19__	19__	__%	__%	_____
y.	Don't use	[ ]	[ ]	[ ]	[ ]	[ ]
z.	Other: _____	[ ]	[ ]	[ ]	[ ]	[ ]

_____

44. At what stages in the development cycle are management reviews generally required?

a. System Requirements Review (added) [ ]

b. Preliminary design [ ]

c. Critical design [ ]

d. Module Design Review (function) (added) [ ]

e. Final configuration audit [ ]

f. Physical configuration audit (added) [ ]

g. Final test (added) [ ]

h. Completion of test and integrating plan (added) [ ]

i. Completion of system test and user test phase (added) [ ]

j. During emergency situations (added) [ ]

k. Preselected milestones (added) [ ]

l. Sporadic management audits (added) [ ]

y. Do not employ management reviews [ ]

z. Other: _____ [ ]

_____

45. Is there any unique aspect to the principal function of your firm (unless you are primarily a software development house) that you have been able to adapt to the software development task?

_____

_____

_____

_____

y. No [ ]

REFERENCES FOR QUESTIONNAIRE

[ASPR, 1976] Armed Services Procurement Regulation (ASPR), Section III, Part 4, "Type of Contracts," Department of Defense (1976)

[Baker 1972] F.T. Baker, "Chief Programmer Team Management of Production Programming," IBM System Journal, Vol II, Spring, pp 56-73 (1972)

[IBM, 1975] "HIPO - A Design Aid and Document Technique," IBM Installation Manual, GC 20-1851-1, IBM Corporation (May 1975)

[Yourdon 1976] Edward Yourdon, How to Manage Structured Programming, Yourdon, Inc., New York (1976)

[Weinberg 1975] Gerald Weinberg, The Psychology of Computer Programming, Van Nostrand Reinhold, New York (1971)

APPENDIX C
COMMENTS ON AND ABBREVIATIONS USED IN THE REDUCTION OF ANSWERS

INTRODUCTION

The purpose of this appendix is to present comments on specific questions, relationships between questions and their answers, procedures used in contriving missing answers, and to list and describe the abbreviations and codes used in this report.

To conserve space and to provide a means of using a computer for analysis, all answers were abbreviated and/or coded (abbreviations and codes will be called just codes for the balance of this report). Because of space limitations and to assist in ease of processing, all alphanumeric codes were restricted to exactly three characters. The use of codes also had an additional advantage; it effectively disguised the answers so that the participants continue to remain anonymous.

The author did not comment on all the questions and answers. If the author had a comment, discussion, or observation on a question, his comments immediately follow the question number. Codes will immediately follow comments. If there are no comments, the codes will follow the question number. If the author has no comment or codes concerning a given question, the question number will be passed by.

Four types of codes were used. The first type was general, applies to all questions, and will be defined after this introductory section. The second type was applicable to only one answer and appears after the question number in this section. The third type of code was general across two or more questions (e.g., FOR for FORTRAN; GPC for general purpose computer), and was listed once the first time it is used. Therefore, all Type Two and Three codes were defined after the question number in which they first appear. The code was separated from its explanation by a dash (--).

The fourth code type applied to question 45. This question was strictly narrative in nature and did not lend itself to multiple choice. Each separate answer was given a separate code.

The author attempted to use codes that were easy to recognize (mnemonic) to reduce the amount of flipping between appendixes.

The letters a through z indicated the sub-parts of the questionnaire. Parts a through w were general questions. Part x was used to indicate the entire question was not answered (i.e., skipped). Part y was used primarily to show "none" of the answers applied or the questions were "not applicable". Part z was used for "other" answers.

TYPE ONE CODES

The code "YES" on the listing opposite a question (Sub-parts a through w) indicated that the surveyee "checked" the answer without comment and the answer is "yes" or "true." If a given question has a "blank" for an answer this indicates that the surveyee answered "no", or that the answer is "false" (this cannot be assumed if the surveyee did not answer at least one part in a multiple-part question).

Sometimes a pseudo question, Sub-part x, was created to indicate that the surveyee did not provide an answer to a given question because he: 1) did not understand the question, 2) felt it did not apply to his project or organization, or 3) just did not feel like answering it. This was done so that the reader would not read a "no" when the correct answer was unknown to the author. Sometimes the surveyee wrote in "unknown," otherwise it was coded "MIS" by the author.

When answered, Sub-part y was coded "NON" to mean that the whole question was answered "no" or "none". The answer to Sub-part y was frequently supplied by the author, therefore, one of the "C" codes was used (see later discussion). Sub-part z was coded "OTH" to mean that the surveyee question was not answered (i.e., skipped). Part y was used primarily to show "none" of the answers applied or the questions were "not applicable". Part z was used for "other" answers.

TYPE ONE CODES

The code "YES" on the listing opposite a question (Sub-parts a through w) indicated that the surveyee "checked" the answer without comment and the answer is "yes" or "true." If a given question has a "blank" for an answer this indicates that the surveyee answered "no", or that the answer is "false" (this cannot be assumed if the surveyee did not answer at least one part in a multiple-part question).

Sometimes a pseudo question, Sub-part x, was created to indicate that the surveyee did not provide an answer to a given question because he: 1) did not understand the question, 2) felt it did not apply to his project or organization, or 3) just did not feel like answering it. This was done so that the reader would not read a "no" when the correct answer was unknown to the authors. Sometimes the surveyee wrote in "unknown" otherwise it was coded "MIS" by the author.

When answered, Sub-part y was coded "NON" to mean that the whole question was answered "no" or "none". The answer to Sub-part y was frequently supplied by the author, therefore, one of the "C" codes was used (see later discussion). Sub-part z was coded "OTH" to mean that the surveyee wrote in another answer and the author was not able to use it any other way (see discussion Appendix B).

As an added note, answers to Sub-parts a through w and z, Sub-part x and Sub-part y are mutually exclusive.

Several of the questions are multi-part. It is assumed that if a surveyee answered any one part of the multi-part question "yes" or "true" then all parts of the questions were answered. Any answers that were not checked were "no" or "false."

Other Type One codes are listed below. These codes were frequently used when the surveyee did not answer a question but made some comment in the margin. Other times these codes were used as the appropriate answer to a narrative question.

DEL -- Deleted by author as revealing the participant

INF -- Infinite, continuous, too numerous to list

N/A -- Not applicable (on this project), didn't use

OTH -- Other

UNK -- Unknown (also included "?" as an answer)

VAR -- Variable

MIS -- Question not answered (supplied by author)

YES -- Yes or true

Upon occasion the author felt it necessary to either answer the question for the surveyee, or change his answer. In the interest of honest reporting, the following codes indicate whether or not the answer was changed/contrived and the reason. These change codes were C01, C02, and C03. C01 has the highest probability that the changed answers reflect the true answer, C02 next highest probability, and C03 the lowest probability. The change codes follow:

C01 -- This answer was supplied by the author and the answer chosen was based on an answer to a different question, e.g., if the survey answered Question 3 with answer b, and he did not answer Question 21, answer 21y was provided by the authors as C01. Again, if the surveyee answered Question 24A but not 24B, answer 24By was coded C01 by the author.

C02 -- These answers were manufactured by the author by compartmentalizing answers provided originally in narrative form, i.e., multiple choice answers were formulated after all the answers were supplied by the participants. These answers were originally in narrative type questions or answers provided under "comments" or "other." An exception to this was when the participant wrote in "none" or another negative comment because a "none of the above" type answer was not supplied by the author. When this happens a "none" answer is manufactured but coded C01.

C03 -- These answers were redirected by the author from the one given by the surveyees as "other or "comment" to one of the existing answers which the author felt was equally as good as the one placed in "comment". This was done to reduce the number of possible answers while still retaining as much accuracy as possible.

TYPE TWO AND TYPE THREE CODES

This section reflects the specific codes and comments concerned with each question and are ordered by the question number. If there is no code or comment necessary for a given question, it is skipped.

2-5 Questions 2 through 5 are related. If any of these questions were answered "none" or "not applicable" and any of the other questions were not answered, answer y was coded C01.

4 The following codes were used in answering this question (these same codes were used for Questions 5, 24, 28 and 29). When there appears to be a large number of identical positions that position is coded into the z answer.

Senior Corporate Officers

VDR -- Director of Very Large Organizations

VOP -- Vice President, Operations

VPC -- Vice President, Data Processing

VPE -- Vice President, Engineering/Function/Area

VPG -- President or Vice President, General

VPO -- Vice President, Organization of Physical Location

Senior Management

MCN -- Center Manager

MCP -- Senior Manager, ADP

MDR -- Senior Director

MEN -- Senior Manager, Engineering/Functional Area

MGR -- Senior Manager, General (includes Division Manager)

MLB -- Laboratory Manager

MPA -- Assistant/Deputy Program Director/Manager

MPD -- Senior Program Director/Manager (as opposed to Project Manager)

Project Management

PAM -- Project Administration

PEN -- Project Engineer

PMA -- Assistant Project Manager, Deputy Project Manager

PMC -- Project Manager, ADP/Computer

PME -- Project Manager, Engineering/Analyst

PMR -- Project Manager

PMW -- Project Manager/Software

PTD -- Technical Director/Manager

Middle Level Management (Second Level Supervisor, Chief)

MAA -- Manager, Administration Applications

MAD -- Manager, Administration

MAS -- Assistant Manager

MAT -- Manager, Advanced Software Technology

MBA -- Manager, Business Applications

MCD -- Manager, Computer Applications

MCE -- Manager, Computer Engineering

MEF -- Manager, Engineering Functions

MGN -- General (unspecified) (Department managers)

MIG -- Manager, System Integration

MOS -- Manager, Operations

MPC -- Manager, Project Control

MSA -- Manager, Application Software

MSC -- Manager, Scientific Applications

MSD -- Manager, Software Development

MSO -- Manager, System Software and Operations

MSR -- Manager, Software Requirements

MSS -- Manager, System Software

MSW -- Manager, Software

MTM -- Manager, Test

First Line Supervisor

FAN -- Systems Analysis Supervisor

FAP -- Applications Supervisor

FCP -- Chief Programmer

FEN -- Engineering Supervisor

FLS -- First Line Supervisors, General (includes group leaders, task leader, section head, technical leader, manager, supervisor, head, etc.)

FOP -- Operations Software Supervisor

FOS -- Operations Supervisor

FPP -- Project Programmers

FSA -- Applications Software Supervisor

FSD -- Software Development Supervisor

FSE -- System Engineer Supervisor

FSS -- System Software Supervisor

FSW -- Software Supervisor

FTC -- Team Chief

FTM -- Test Supervisor

FUT -- Utilities Software Supervisor

Lead ADP Personnel (includes Senior, Lead, Senior Project, Chief, etc., ADP Personnel

LAP -- Lead/Senior Application Software Programmer/Analysis

LOP -- Lead/Senior Operation Software Programmer/Analysis

LPA -- Lead/Senior Programmer/Analyst

LSA -- Lead/Senior Analyst

LSD -- Lead/Senior Designer

LSP -- Lead/Senior Programmer

LSS -- Lead/Senior Systems Software Programmer/Analysis

LUT -- Lead/Senior Utilities Software Programmer/Analysis

Lead Engineer/Functional Personnel (includes Senior, Lead, Senior Project, Chief, Etc., Engineering/Functional personnel)

LSC -- Lead/Senior Consultant

LSE -- Lead/Senior Engineer

LSW -- Lead Software Engineer

ADP Personnel

CAN -- Analyst

CAP -- Application Programmer Analysis

CDA -- Data Base Analyst

CDI -- Digital Computer Analysis

CDS -- Data System Specialist

CDV -- Software Developer

CMS -- Software Configuration Management

COP -- Computer Operations

CPA -- Programmer/ Analyst

CPR -- Programmer

CSA -- System Analysis

CSN -- System Programmer Analysis

CSP -- Scientific Programmer

CSY -- Systems Programmer

Engineer/Functional Personnel

ECO -- Cognizant Engineer

ECS -- Computer System Engineer

EDG -- Designer

EDS -- Software Development Engineer

EIG -- Integration Engineer

ENG -- Engineer/Functional/Designer

ENS -- System Engineer

ENT -- Test Engineer

ESA -- System Analysis

ESP -- Engineering Specialist

ESS -- Systems Software Engineer

ESW -- Software Engineer

Supporting Staff

SAD -- Administration

SDA -- Data Aid

SLI -- Support Librarian

SPC -- Project Control

General (Unspecified Personnel)

WMT -- Member Technical Staff

WOR -- Worker, Individual, Staff

Other Positions

OCU -- Customer

OMG -- Management Analysis

OPI -- Pilot

OSS -- Senior Scientist

5 The codes used in answering this question are the same as for Question 4 plus:

DIR -- Direct Line from Senior ADP Manager to Project Manager

10 The budget year (when supplied) is shown as the last two digits of the year preceeded by a zero (e.g. 1971 is coded 071, 1975 is coded 075, etc.).

11-12 Questions 11 and 12 are related. If Question 11y is answered and Question 12 is not answered, 12y was coded C01.

14 The number of people were reported in units according to the following method. The number of people, d(1), d(2), d(3), . . ., d(n) can be represented by d(1), d(2) x 10 **R where R=N-2, was coded on the listing as d(1)d(2)R.

16-18 Questions 16 through 18 are related. If any of these questions were answered "none" or "not applicable" and any of the other questions were not answered, answer y was coded C01.

20-21 Questions 20 and 21 are related. If Question 20b is answered and Question 21 is not, answer 21y was coded C01.

24 The codes used in answering this question are the same as from Question 4 plus:

SAM -- The same as the question

28-29 The codes used in answering these questions are the same as for Question 4.

30 The following codes were used in answering this question. These are divided into 1) manufacturing codes and 2) software name. The software name was sometimes a proper name and sometimes a generic name.

Manufacturing Codes

ADR -- Applied Data Processing

CDC -- Control Data Corporation

CFG -- Cain, Farber and Gordon

CSC -- Computer Science Corporation

DEC -- Digital Equipment Corporation

FED -- Federal Simulation Center

FST -- Foresite, Inc.

HAC -- Hughes Aircraft Company

HPK -- Hewlett-Packard Corporation

IBM -- International Business Machines

IDP -- Inovation Data Processing

INH -- In-house

ITI -- Illinois Technology Institute

KFT -- Kearfott

MRI -- MRI

NAN -- NANODATA, Inc.

TRW -- TRW, Inc.

UNI -- Sperry-Univac Corporation

Software Name Codes

AFL -- Automatic flow charter

ALL -- All that are Available

APT -- APT

ASS -- Assembler

BUG -- Debugger

CFM -- Configuration Management

COM -- Compiler

CSS -- CSS-II

DOC -- Documentor

DSL -- Design language

EAL -- Edit and load

EMU -- Emulator

ESC -- ECSS

FLI -- FLIT

FST -- Foresight

FUR -- FURPUR

GEN -- General tools

HIF -- HIFTRAN

IMS -- Information Management System

INT -- Intercom

LIB -- Library Aids

MON -- Software monitor

MTH -- Math package

MUL -- Multivendor

NAS -- NASTRAN

NET -- Network generator

OPR -- Operating system

PDL -- Program design language

PRC -- Process construction

PRO -- Project Dependent

PRT -- PERT planning

RCT -- Requirement code/traceability

REQ -- Requirements Analyses

RFI -- Remote File Indicator

RTX -- Real time executive

SPR -- Structural preprocessor

SPX -- SPREDEX

SSW -- System software

STA -- Standards construction

SYG -- System generators

S20 -- System 2000

TET -- Test tools

THR -- Threads Management System

TPN -- TPNS

TRL -- Translator

TSO -- TSO data set editing

TXE -- Test editors

UTL -- Utilities

31-33 Questions 31 through 33 are related. If any of these questions were answered "none," "not applicable," or "no" and any of the other questions were not answered, Question 31 would be answered "N/A," and Question 32b and 33y would be answered C01.

32 The following codes were used to answer this question.

CNG -- Consultant Group

DPR -- Data Processing

EVG -- Software Evaluation Group

FSS -- System Software Supervisor

OUT -- Outside Organization

PTD -- Technical Director

SQA -- Software Quality Assurance

SWS -- Software Science

SWT -- Software Technology Group

SYS -- Systems Group

33 The following codes were used to answer Question 33b1. Answer to 33b2 was used only if two languages are reported.

ASS -- Unspecified Assembler

COB -- COBOL

FOR -- FORTRAN

JOV -- JOVIAL

PL1 -- PL/1

34 The codes used in answering this question are the same as for Question 30.

36 The following codes were used to answer this question:

COR -- Core requirements per program

CPU -- Computer usage per run

DRP -- Discrepancy report

KBU -- Number of known bugs

LOC -- Lines of codes (per time/dollar etc.)

MPT -- Manhouse per instruction (completed task)

NCT -- Number of compiles per task

NCU -- Number of compilable units

NSM -- Number of schedules met/jobs completed

PDO -- Pages of documentation

RES -- Response time (on-line terminals)

RWC -- Rate aided work charting

TAT -- Turn around time

TBZ -- Table sizes

TTC -- Time to complete task

37-40 Questions 37 through 40 are related. If any of these questions were answered y ("none") and not all of the other questions were answered, answer y was coded C01.

43 The following codes were used in answering this question:

For Parts a and b the same method as for Question 10.

For Parts c and d the number represents the percent.

For Part e

INC -- Increase

DEE -- Decrease

STY -- Steady (no change)

Type Four Codes

45 The following codes were used in answering this question:

B01 Freedom to change own product line hardware to benefit software.

B02 Provide simulated hardware interfaces early in design software groups - participates in design of acceptance test devices.

B03 We are systems management oriented and sincerely believe that the same discipline which applies to the managment of hardware development are applicable to software development.

B04 The use of a software integration to integrate the functional equations (i.e. controls, guidance, etc.) into a Part I specification which takes target computer architecture and subsystem architecture into account.

B05 Existing configuration control system for hardware has been adapted very effectively for software control.

B06 Close/early coordination between engineering and software development personnel.

B07 Use of a system integration test start to integration and test hardware and software before starting test of the system in the vehicle. This qualifies the software for flight use.

B08 Engineering discipline.

Appendix D

NARRATIVE AND CANDID (CLEAR TEST) ANSWERS TO SELECTED QUESTIONS

INTRODUCTION

This section deals with actual, unaltered, answers provided to a series of narrative response questions, specifically, Questions 1, 2, 3, 4, 5, 24, 28, 29, 30, 32d 34 and 36. The narrative response questions asked for answers for which the author could not provide a set of answers, because of the wide variety of possible answers. Each discernible response, whether included in the following pages or not, has also been analyzed and coded to facilitate entry in the tabulation listing in Section 2. Since this reduction of comment to code destroyed some of the understanding, the author felt it worthwhile to include this "verbal" section in the report.

The answers as they appear in the following pages have been "cleaned up" to assure anonymity from the standpoint of author, firm, and project. Identical or nearly identical responses have been eliminated. With the exception of the "clean up" and correction of the most obvious spelling and punctuation errors, those responses included in the following pages are as received, and though they do not in every instance answer the question asked, they relate to the subject. As an aside, the author makes no claims to total understanding of every response.

QUESTION 1 What position do you hold in the company?

ANSWERS

The following answers are the various titles of personnel who answered the questionaire (grouped as to their relationship to the company).

a. Senior Corporate Officer

President

Assistant associate administrator for center operations (systems management)

Vice president of operations division

Assistant to the director

b. Senior ADP Officer

Chief, data processing

Branch chief

Chief, data computation

c. Senior Functional Area (Non-ADP)

Director, mission control and data processing

Director of engineering

d. Project Manager Software Development

Manager, mini/micro based systems department

Senior scientist, computer programming lab, ground systems group

Group supervisor

Software Systems program manager

Manager, operations, computer systems division

Software group leader

Program engineer for data systems

Engineering group head - software development

Supervisor of automatic test software section

Engineering software supervisor

Software engineer

Assistant chief engineer for computer resources

Laboratory manager

Engineering management

Manager, software development

Group engineer

Manager - product programming and development

Manager - software development laboratory

Manager - computer subsystems design

Manager, plans and control, data processing systems, system technology program

1st level manager

Chief engineer, digital computer and software engineering

Manager

Manager, software systems operations

Command and control manager

Department manager

e. Technical Director, Quality Assurance, etc.

Director, quality assurance

Technical director

f. Senior Corporate Staff

Applied mathematician

g. Project Individual

System analyst

Project individual

QUESTION 2 What is the title/position of the senior ADP officer in the firm?

ANSWERS

The following are the various titles of personnel listed on the questionaire (grouped as to their relationship to the company).

a. Corporate Officer

President

Vice president/general manager system engineering and integration division

Division president

Vice president of operating division

Vice president - software engineering

Vice president, aerospace systems

Vice president and director, computer systems division

b. Chief, Data Processing

Chief, data processing

Manager of software engineering

Manager of software development

Chief, digital computations

Manager, software development laboratory

Director, avionics control and information system

Director, data processing subsystems

Manager, business information system

Director of data processing

Director

Chief, computation division

Head, data processing center

Corporate director

Manager, information systems operations

Director, information processing

Manager, data systems services

Section head, computer programs

Department Head

Manager of engineering programming and computation department

Manager of programming and computation department

Director, administration

Director of computing and data processing

Division chief

Manager, information systems and computer services

Assistant director for automatic data processing

Software group leaders

c. Assistant Comptroller

Assistant associate administrator for center operation (systems management)

Assistant comptroller

d. Functional Area, Software Analysis

Software engineer

QUESTION 3 What is the title/position of the individual to whom the senior ADP officer reports (e.g., president, comptroller)?

ANSWERS

The following are the various titles of personnel listed on the questionaire (grouped as to their relationship to the company).

a. Corporate Officer

President

Vice president and general manager

Group vice president of parent organization

Vice president, engineering

Vice president, systems technology program

Vice president, finance

Senior vice president - technical operations

b. Comptroller

Comptroller

c. Senior Functional Area (non-ADP)

Director of engineering

Assistant manager, engineering operations

Manager, engineering operations

Manager, finance

Director

Director for research support

Director western data center

Director, systems engineering

Assistant lab director

Division manager, finance

Director of mission and data operations directorate division chief

d. Senior Corporation Staff

Associate administrator, center operations

Chief, avionics engineering

Branch head

Data Analysts

Data processing engineers

Senior scientists

Manager, advanced programming staff

Manager, software engineering and technology department

Manager, program production department

Manager, air defense systems department

Manager, SURTASS programming department

Manager, software production department

QUESTION 4 What are the titles/positions of the individuals reporting directly to the senior ADP officer? (e.g., chief, Software Development Division)

ANSWERS

The following are the various titles of personnel listed on questionaire.

Vice president
Manager, software systems operations
Manager, information processing operations
Center managers
Project managers
Manager, software requirements and analysis
Manager, software development
Manager, software test and development
Manager, software technology
Director, computer operations
Director, development
Director, systems integrity
Director, resources planning
Director, telemetry systems
Director, business development
Director, western operations
Director, project
Assistant to vice president
Staff assistant
Department managers
Manager, washington operations
Chief engineer, data control & processing subsystems
Project managers, software department
Director, management information system
Manager, plant engineering
Manager, office services
Chief pilot
Manager, administrative support center

Chief, management section
Chief, software development section
Chief, operations section
Director, ADP resources
Director, distribution and management systems
Director, requirements and material control systems
Director, technical support
Director, stock control and distribution systems
Lead programmer, utilities
Lead programmer, applications
Lead programmer, operating systems
Supervisor, utilities
Supervisor, operating systems
Supervisor, applications
Supervisor, test software
Chief, systems and operations
Chief, digital applications
Assistant to chief, digital computations
Department managers
Programmers
System analysts
Manager, computer operations
Manager, software engineering
Manager, plans and control
Supervisor, scientific applications software
Supervisor, scientific applications programs
Supervisor, scientific applications operations
Supervisor, business applications software
Supervisor, business applications programs
Supervisor, business applications operations
Supervisor, business systems analysis
Supervisor, hardware planning
Chief, computer engineering
Chief, computer programming

Chief, computer systems
Chief, instrumentation development
Director, central
Director, western
Director, eastern
Chief, operations intregation
Chief, management information systems software development
Manager, data processing division
Manager, scientific computing division
Manager, test data processing
Director, software department
Director, systems design
Manager, technology
Manager, operations
Software development staff
Operators
Chief, scientific applications branch
Chief, computer systems branch
Chief, computer operations branch
Chief, administrative applications branch
Chief of business systems
Chief of scientific/engineering data systems
Staff engineer
Unit head
Software supervisor
Sections chiefs
Mission operations computing division head
Information processing division head
Software engineers
Software group leaders
Director, ADP management office
Director, information systems office

QUESTION 5 What is a typical line of authority from senior ADP officer through Software Devleopment Project Manager?

ANSWERS

The following are the various combinations of personnel and line of authority listed on questionaire.

Laboratory manager; department managers; associate project managers

Vice president; operations director; program manager

Vice president; functional manager; project head

"Direct"

Division president; center manager; location manager; project manager

Vice president/general manager; manager, software systems operations; manager, large software project

Director; assistant director; project manager

Director, avionics control and information systems; chief engineer, data control and processing subsystems; manager, computer subsystem design; section chief, software design

Director; manager; branch chief, software development; section chief, programming function

Manager; supervisor; unit head; project manager

Automatic data processing officer; section head; worker

Corporate director; director; manager; chief; supervisor; project leader

Director; division manager, department manager; supervisor

Director, administration; director, management information system; manager system programming

Chief, data automation; chief, software development section; chief, products unit; software development project manager

Assistant comptroller; director, systems development; chief, development divisions; chief, development branches; software development project manager

Chief, digital computations; chief, digital applications; software development project manager

Software lab manager; department manager; section manager; software project manager

Division chief; branch chief; project manager

Chief; programmer

Section chief; group supervisor

General manager, business section; manager, programs section

Assistant director for ADP; director of missions and data operations directorate; mission operations computing division head; information processing divisions head

Chief, avionics engineer; software group leader; software engineer

Senior ADP officer; director, information systems office; chief, systems development division; project manager

SPO chief; chief engineer; technical advisor for computer resources; computer systems engineer

QUESTION 24 (Part I) If possible, outline the composition of a typical large development team as it would be employed in your firm. To place the team in context, a hypothetical project description may be included (e.g., development of an on-line air cargo manifesting capability).

Hypothetical project description (optional):

ANSWERS (Part I)

The following is a list of descriptions shown on questionaire.

Develop a passive sonar system

Computer-aided dispatch system

Tactical command and control

Development of an on-line manufacturing material system for generating working paper to the shop floor during aircraft manufacture

Developing a crew training simulator system for a weapon system (e.g., aircraft weapons system)

Facilities specifications for tactical

Computer command and control plus intelligence

Development of a submarine sonar system

Uniform cost accounting

Requirements computation

On-line data collection

Airborne avionic weapons system

Develop a computer graphics oriented aircraft synthesis program

Conf. for flight software

Automating a world-wide network of tracking stations

QUESTIONS 24 (Part II) Fractions may be used to indicate that the position is not considered a full time job. The folliwng is an example of the notation to be used if one individual occupies more thatn one position:

f.	Administrator		1/3 (g)
g.	Librarian	DESIGN ASSISTANT	2/3 (f)

The letter in parenthesis is intended to tie the same individual to positions f and g.

Possible Title: a. Project Manager; b. Asst. Project Manager; c. Senior Analyst; d. Team Chief; e. Asst. Team Chief; f. Administrator; g. Librarian; h. Application Analyst; i. Functional analyst; j. Applications Programmer; k. Operation Systems Programmer, l. Tester; m. Integrator.

ANSWERS (Part II)

The following indicate typical development teams as shown in response to Question 24:

Project Manager, 1/3; Senior Analyst-Member of Tech Staff, 1/3; Applications Prog-Members of Tech Staff, 3 1/3

Project Manager, 1; Technical Director, 1; Department Managers, 3; Section Head, 7; Administrator, 1; Librarian, 1; Functional Analyst, 5 ; Applications Programmer, 20; Operation Systems Programmer, 5

Project Manager, 1; Assitant Project Manager, 1; Senior Analyst, 10-12; Department Manager, 3-4; Administrator, 1-2; Application/Programmer Analyst, 20

Project Manager, 1; Assistant Project Manager, 3; Work Package Manager, 6; Administrator, 1; Librarian, 1; Application Analyst, 5; Programmer/ Analyst, 15; Quality Assurance, 1

Computer Analyst; Computer Specialist

Project Manager/Director, 1; Manager, 2; Senior Designer/Engineer, 4; Administration, 1/2; Application Analyst, 10; Applications Programmer, 30; Operations Systems Programmer, 5; Tester, 7.

Program Manager, 1; Deputy Program Manager,1.

Program Manager, 1; Senior Analyst, 4; Administrator, 1; Application Programmer, 8 (Programmers in testers and integrator).

Project Manager, 1; Assistant Project Manager, 2; Senior Project Analyst, 6; Project Analyst/Programmer, 5; Digital Computing Analyst/Programmer, 2; Digital Computing Analyst/Operator, 2.

Project Manager, 1/2; Assistant Project Manager, 1/2; Team Chief, 1/2; Assistant Team Chief, 1/3.

Project Manager, 1; Assistant Project Manager, 1; Senior Analyst, 3; Team Chief, 2; Assistant Team Chief, 2; Administrator, 1; Application Analyst, 16.

Project Manager (cognizant engineer), 1; Assistant Project Manager (cognizant programmer), 1; Application Analyst (engineer), 1/3 (i & 1); Functional Analyst (engineer), 1/3 (h & 1); Programmers; Tester (engineer), 1/3 (h & i); Data Systems Integrator.

Program Manager, 1; Deputy Program Manager, 1; Systems Engineer Manager, 1; Software Development Manager, 1; Work Unit Leader, 10; Program Planner/Controller, 2; Configuration Management Specialist, 2; System Engineer/Analyst, 8; Functional Analyst, 8; Applications Programmer, 10; System Test Engineer, 3; System Integration Engineer, 3.

Project Manager, 1; Assistant Project Manager, 1; Senior Analyst, 2; Team Chief, 1; Assistant Team Chief, 1; Librarian, 1; Applications Programmer, 3; Operation System Programmer, 2.

Section Head, 1; Data Analysts; Programmers; Data Processing Engineers.

Program Manager, 1; Project Engineer, 1; Tech Director, 1; Task Leader; Administrator, 1; Programmers; Engineers.

Senior Analyst, 1; Administrator, 1/2; Applications Programmer, 2; Operation Systems Programmer, 2 1/2.

Project Manager, 1; Assistant Project Manager, 1; Senior Analyst, 1; Project Engineer, 3; Administrator, 2; Systems Engineers, 6; Scientific Programmers, 5; Hardware Engineers, 10.

Project Manager, 1; Lead Designer, 1; Chief Programmer, 1; Designer, 1; Programmer, 3.

Manager, 1; Assistant Manager, 1; Senior Systems Engineer, 4; Section Head, 2; Technical Staff, 3; Librarian, 4; Senior Programmer, 10; Programmer, 15; Software Test Engineer, 3.

Project Manager, 1; Technical Director, 1; Team Chief, 5; Administrator, 1; Librarain, 1; Application Analyst, 3; Functional Analyst, 3; Applications Programmer, 20; Operation Systems Programmer, 8; Tester, 5; Intregator, 5.

Project Manager, 1; Supervisors, 2; Senior Analyst (Team Leader), 3; Lead Programmer, 3; Data Aide (Documentation), 1 1/3; Librarian, 2/3; User Analysts (work for customer), 6; Applications Programmer, 15; System Intregrator Leader, 1; Data Base Designer, 1; Data Base Administrator (Procedures, etc.), 2; Transition to Production Interface, 1.

Computer Systems Engineer, 1.

Senior Systems Analyst, 1; Management Analyst, 1; Systems Analyst/ Programmer, 1; Program Analyst, 2; Systems Software Engineer, 1/4.

Project Manager, 1; Data Systems Specialist, 3; Senior Programmer Analyst, 6; Administrator, 1/2; Librarian, 1; Application Programmer/ Analyst, 20; Operation Systems Programmer/Analyst, 8; Tester, 6; Intregrator, 3; Documentation Aides, 3.

Project Engineer, 1; Senior Consultant, 1/3; Senior Engineer, 1; Librarian, 1 per 10 programmers; Programmer, 12.

Project Manager, 1;, Assitant Project Manager, 1; Senior Analyst,

5; Applications Programmer, 20; Intregrator, 1.

Project Manager, 1; Assistant Project Manager, 1; Team Chief, 3; Administrator, 1; Librarian, 1; Functional Analyst, 5; Applications Programmer, 8; Tester, 1.

Senior Analyst, 4; Application Analyst, 2.

Engineering Manager, 1; Project Engineer, 2; Project Leader, 3; Group Leader, 8; Administrator, 1; Software Engineer (Librarian), 1/2; Software Dev Engineer, 14 1/2; System Analyst (Application), 3; System Analyst (Functional), 8; System Analyst/Tester, 12; System Analyst/ Intregator, 11; Staff Assistants to System Project Engineer, 2.

Project Engineer, 1; Engineering Specialist, 1; Supervisor, 1/2; Scientific Programmer, 5.

Project Manager/Software Engineer, 1; Senior Programmer, 2; Info Systems Analyst, 5.

Project Manager, 1/2 (1/2 supervising other work); Applications Programmer, 1; System Software Engineer, 2

Project Manager, 1; Assistant Project Manager, 1; Senior Systems Analyst, 2; Deputy Project Manager for Application Software, System Software, Data Base Development, Test and Evaluate, QA, Training, etc., 3-7; Administrator, 1; Librarian, 1; Systems Analyst, 4; Applications Programmer, 8; Tester, 6; Intregator, 6

QUESTION 28 Which Manual reporting procedures are used in project monitoring and management? At What level do they originate, and how how high do they go? How often were they aggregated, condensed, or eidted as they moved up the chain?

ANSWERS

Report Title	Lowest Originator	Highest Recipient	No. of AGGS/EDTS
Weekly Activity (Verbal)	Indiv worker	Proj mgr	-
Project Status (Verbal)	Indiv worker	Proj mgr	-
Significant Change (Verbal)	Indiv worker	Proj mgr	-
Weekly Activity	Task mgr	Dept mgr	1
Project Status	Task mgr	Div mgr	1
Significant Changes	Task mgr	Div mgr	1
Weekly Activity	Software engr	Data proc mgr	none
Project Status	Software engr	Proj mgr	3
Significant Changes	Data proc mgr	Proj mgr	4
Weekly Activity	Worker	Customer	-
Project Status	Lead Prog	Chief, ADP	-
Significant Items	Senior Prog/Anal	Prog mgr	-
Performance Measuring Sys	Work package mgr	Customer	1
Variance Report	Work package mgr	Customer	1
Weekly Activity	Team ldr	Asst dir	2
Project Status	Supervisor	Director	2
Significant Change	User dept	Ch rev board	1
Crab Control Status	Test team	Carb cont bd	1
Design Review Report	Review team	Vice pres	-
Financial Report	Proj mgr	Vice pres	1
Weekly Activity	Ind contrib	Div gen mgr	6
Project Status	Ind contrib	Div gen mgr	6
Significant Change	Prog mgr	Div gen mgr	4
Monthly Activity	Programmer	Chief ADP	2
Project Status	Proj mgr	Chief, Organ	4
Weekly Activity	Group engr	Director	2
Weekly Activity	Section	Proj mgr	1
Project Status	Proj mgr	President	2
Weekly Activity	Programmer	General mgr	3
Project Status	Programmer	General mgr	3
Significant Change	Programmer	Software mgr	2

Report Title	Lowest Originator	Highest Recipient	No. of Aggs/Edits
Weekly Activity	Prog/Engr	General mgr	3
Project Status	Lead prog	General mgr	3
Significant Change	Lead prog	Dir of engr	2
Weekly Activity	Analyst/Prog	Proj mgr	2
Project Status	Analyst/Prog	Proj mgr	2
Significant Change	Analyst/Prog	Proj mgr	2
Weekly Activity	Programmer	Proj engr	-
Project Status	Proj engr	Div mgr	2
Weekly Activity	Engineer	D P Dir	-
Project Status	Engineer	Director	-
Significant Change	Engineer	Director	-
Weekly Activity	Lead engr	Proj mgr	4
Project Status	Software mgr	Proj mgr	2
Significant Change	Software mgr	Proj mgr	2
Weekly Activity	Prog/Analyst	Proj mgr	-
Project Status	Prog/Analyst	Proj mgr	-
Significant change	Prog/Analyst	Proj mgr	-
Weekly Activity	Indiv prog	Proj mgr	2
Project Status	Proj mgr	Center mgr	5
Project	Proj admin	Varied	-
Weekly Activity	Programmer	Proj mgr	-
Project Status	Proj prog	Proj mgr	-
Significant Change	Proj prog	Proj mgr	-
Weekly Activity	Staff	Prog mgr	-
Project Status	Task leader	Customer	1-2
Significant Item	Senior	Mgr	-
Weekly Activity	Proj mgr	Vice pres	-
Project Status	Lead prog	Vice pres	3
Significant Change	Proj mgr	Vice pres	-
Weekly Activity	Unit head	Director	3
Project Status	Programmer	Proj mgr	2
Weekly Activity	Programmer	President	5
Project Status	Lead prog	President	4
Weekly Activity	Sr analyst	Dir MIS	?
Project Status	Dir mis	Dir admin	?
Significant Change	Dir mis	Dir admin	?
Weekly Activity	MTS	Proj mgr	-
Project Status	Proj mgr	Asst vp	1
Significant Change	Proj mgr	Asst vp	-

Report Title	Lowest Originator	Highest Recipient	No. of AGGS/EDTS
Weekly Activity	GP head	Prog mgr	2
Project Status	GP head	Prog mgr	2
Significant Change	Section head	Prog mgr	1
Project Status	Cog engr	Sect chief	1
Significant Change	Cog engr	Sect chief	-
Contract Progress Schedule Report - Semimonthly	Proj dir	ISO director	0
Keypunch Activity and Xerox Utilization Report - Monthly	Oper mgr	Oper chief	0
ADP - Daily Operational Report	Oper mgr	Oper chief	0
Financial Management Report	Proj mgr	ISO director	0
Administrative Status of Work Orders	Prog level	ISO director	2
Weekly Significant Activities Report	Proj leaders	ISO director	0
Analysis - Government - owned/Contractor Held Property	Proj mgr	ISO director	0
Contractor Organization and Personnel Report	Proj mgr	ISO director	0
Equipment Maintenance Records Report	Manufacturer's engineer	Oper chief	0
Commercial Time Share Activity Report	Proj mgr	ISO director	
Privacy Act - Contractor Personnel Access List	Proj mgr	ISO director	0

NOTE: ISO - Information System Office

QUESTION 29 Which automated reporting systems were used in project monitoring and management?

ANSWERS

System	Lowest Originator	Highest Recipient
Manhour/Activity	Programmer	Chief, ADP
Manday/Task	Programmer	Chief, ADP
Manhour Accounting	Programmer	Chief, ADP
Manhour/Activity	Lead Engr/Prog	Director
Manhour/Activity	Analyst/Prog	Project Mgr
Manday/Task	Analyst/Prog	Project Mgr
Manhour/Activity	Librarian	Dept. Mgr
Manday/Task	Programmer	Project Mgr
Manhour/Activity	Software Engr	D P Mgr.
Manday/Task	SR Programmer	Software Engr
Manhour/Activity	Engineer	Manager
Manday/Task	Engineer	Manager
Manhour/Activity	Worker	Section Head
Manday/Task	Varies	Varies
Cost Data (Time cards)	Indiv	Div Mgr
Manhour/Task	Prog/Analyst	Project Mgr
Accounting System	-	-
Manday/Major Project Task	All Echelons	All Echelons
Manday/Task	Staff	Project Mgr
Manhour/Activity	Admin	Manager
Cost-Schedule-Controll-System	Worker	Customer
Manday/Task	Lead Prog	Proj Mgr
Manhour/Activity	Lead Prog	Proj Mgr
Manhour/System Function	Indiv Contributor	Proj Mgr
Manhour/Activity	Programmer	Chief, ADP
Pert Analysis	-	-
Manhour/Activity	Individual	The whole world

Tape/Disk Pack Library Report	Tape Librarian	Operations Chief	0
Daily Computer Utilization Report	Operations Manager	Operations Chief	0
Monthly Summarization of Computer Utilization Report (JARS)	Operations Manager	Operations Chief	0
Work Order Status Report (RMAS)	Programmer Level	ISO Director	0
Monthly Computer System and Services Usage Report (RMAS)	Programmer Level	ISO Director	0
Labor Distribution Report (RMAS)	Programmer Level	ISO Director	0
Periodic Resource Utilization Summary	Programmer Level	ISO Director	0

NOTE: ISO- Information Systems Office

QUESTION 30 Which commercial, or what locally developed software was employed to assist in the development task? (e.g. LIBRARIAN, Applied Data Research) (If system was of local origin, give very brief description, e.g. structural pre-compilen, automatic flow chart, etc)

ANSWERS

NAME (or description)	VENDOR (or description)
Threads Management System	CSC (V & V Tool)
Automatic Flowcharter	CSC
CMS-2 Structured pre-processor	
SHARE -7	USN
DEBUG	Fortran Debugger
DOCTOR	Fortran Source Documentation
FORFLO	Fortran Flow Charter
FORESIGHT	Forsight, Inc.
PERT/EXPERT	Planning package
MPS LIB II	Source edit & loader
SYM - II	Assembler
IMSL LIBRARY	Internal matl/Stat Library
NASTRAN	CSC
APT	ITI
Structured Pre-compliers	IBM
Requirement Language/Analyzer	TRW, Univ of Michigan
Prog Definition Language	CAINE, FARBER, & GORDON
Requirements - Code Traceability	TRW
Configuration Management	TRW
Process Construction	TRW
Standard Auditor	TRW
Timeshare/Text Editor	TRW
TESTS TOOLS	TRW
SPREDEX	CSC
CSS - II	IBM
ECSS	FEDSIM

NAME (or description	VENDOR (or description)
Various Cross Assemblers are compilers	In-house
TSO Data Set Editing	IBM
Library Support Aids	IBM
Fortran Pre-processor	Competative
Text Editors	In-house
Flow Charters	In-house
Compilers	In-house
TSO/CRS/ATMS II/MVS	IBM
Cobol Compiler and library	IBM
Fortran Compiler and library	IBM
CVE/P-K/LAV	Boole & Babbage
EDR/DSP	Innovation Data Processing
System 2000	MRI
Psytran	-
IRS	Sigma Data Computing Corp
Stat Programs for Social Science	SPSS, Inc.
Remote File Inquiry	Kennedy Space Center/IBM
Emulator	Emulate INTEL 3000 or 8080
Impact	Program activity network generator
Auto Flop/Flow Charter	In-house
WYLBUIZ/Text Ed/For	IBM
Info Management System	IBM
Social Compiler System	Hughes
CMS-2 Support System	UNIVAC
HIFTRAN	HAL Pre-processor for IFTRAN
SPDL	Design language
SFTRAN, RATFOR, FORCE	Fortran pre-compilers
TIDY, INDER, FURPUR	Utilities processors
SSG	
BTS, MFS	IBM

NAME (or description)	VENDOR (or description)
TPNS	IBM
FDR	Innovation Data
IMS IN?IRE	*CGA*
Librarian	ADR
Data Catalog	Synergistics
Mark IV & Mark IV-IMS Bridge	Infomatics

QUESTION 32a Did the firm have a special organization or group that aided the project manager in selecting software development aids/packages?

ANSWERS

Title:

Software Quality Assurance Section

Software Sciences

Data Processing

Computer System Engineering Branch

Tech Advisor for Computer Systems

Software/Hardware Evaluation Group

Corporate Systems

User Consultant Group

Data Base Technology Group

Software Technology Group

Director Tech. Support

COMMENTS:

Funded by R & D and projects

Occasionally assisted by another company division

Assistance available on voluntary basis from Data Processing Center

Individulas have own ADP "assets"

Informal Group

QUESTION 34 Which Software Development aids (e.g., copy library) supplied by the hardware manufacturer did you use to assist in application system development?

ANSWER:

NAME	MANUFACTURER
Assembler/Loader	Kearfott
Emulator/Simulator	Kearfott
FURPUR	Univac
Fortran Libraries	Univac
FLIT	Univac
ALL	DEC PDP-LD Operative System
ALL	CDC CYBER
QM-1 Emulators	NANODATA
Compliers, Assemblers, Math Routines	CDC
INTERCOM	CDC
IMS	IBM
ALL	Multiple
All Available	
Many	IBM, CDC, UNIVAC, DEC, OTHERS
Systems Software	IBM
Documentation	CDC
Packages	
CSS-II	IBM
ECSS	FEDSIM
Various Cross Assemblers & Compliers	Mostly in-house
TSO Data Set Editing	IBM
Library Routines	IBM
Standard	OS and utilities
Fortran	
Editors	
DeBug	

NAME	MANUFACTURER
Sys Gens, Memory Maps, Dumps	
Fast Dump Restore	Innovation Data Processing
Sys 2000 DBMS (Not long)	MRI
IRS	Sigma Data Computing Corp
RFI	Kennedy Space Center IBM
Text Editor	Any
O/S - RTE	HP
O/S	IBM
CMS-2 M & V Support Package	Univac
IMS	IBM
TPNS	IBM
BTS, MFS	IBM
DB PROTOTYPE	IBM

QUESTION 36 List manually derived productivity indexes such as lines of code, program errors, turn arounds required per completed task, etc., that you employed in monitoring performance.

ANSWERS:

Lines of code

Time to complete program module

Number of compilable units

Manhours/Instruction

Factors for type SW

Real time application

Support SW, compilers

Assy's

Discrepancy reports

Computer usage for checkout

Turn around time

PP time

CA time

Response time (on line terminals)

Number of known bugs

Core requirement changes for code

Lines of completed code generated

Number of complies/completed task

Number of manhours expended/completed task

Number of schedules met/completed task

Pages of documentation generated/completed task

Table sizes

2.5 compiles per program through implementation

Jobs processed per month/manhour

Test hours/programmer/month

Time to complete

Rate aided work checking

Dollars/lines of operational, documented code

L.O.C./unit time

Lines of code should not be used in monitoring performance

CALIFORNIA STATE UNIVERSITY, SACRAMENTO
6000 J STREET, SACRAMENTO, CALIFORNIA 95819

August 1, 1981

TO: Participants in the AIAA Project Management Survey

Enclosed is SM-ALC/MME TR 79-54, Volume I, dated 18 Dec 1979, which reduces and formats data from the survey in which you participated. A limited number of copies were printed and generally only participants in the survey are sent a copy of this data. In addition, a copy of this report and the machine listing of the data will be forwarded to:

RADC/ISISI
GRIFFISS AFB, NY 13441

(315) 336-0937
AUTOVON 587-3395

for retention in the RADC Data & Analysis Center for Software. This is the last volume in the report and one of the more interesting. Data from this volume has never been used in any paper or report.

A paper using data from Volume II will be published in the July issue of The IEEE Transactions on Software Engineering. Another paper from Vols. II and III will also be published in the Transactions next spring. A companion paper "The Challenge of Software Engineering Project Management" was published in Computer, August 1980. A paper "Organizational Structures Used in Software Development by the U. S. Aerospace Industry" which used data from Volume II was published in The Journal of Systems and Software 1, 283-297 (1980). And lastly, Art Pyster from the University of California at Santa Barbara and I are working on a project management reference book entitled The Pitfalls of Software Engineering Project Management: In Defense of the Project Manager, that will use the project management data along with other information.

Arthur Pyster, UCSB, and I are still soliciting professional level papers on the practical aspects of software development and project management to be published in a special issue on project management in the Software Engineering Transactions, Spring 1982. If you have such a paper or are interested in writing one, please contact the editor, IEEE Transactions on Software Engineering, Les Belady or myself.

Since this is probably the last correspondence you and I will have concerning the AIAA Project Management Survey, I want to thank you most heartily for your support over the past four years. If you have any comments or questions, you can contact me at home (916) 481-5482 or at the University (916) 454-6834.

Sincerely,

R H Thayer

Richard H. Thayer, Ph.D.
Lecturer in Computer Science

Encl.
THE CALIFORNIA STATE UNIVERSITY AND COLLEGES


FILMED
9-8